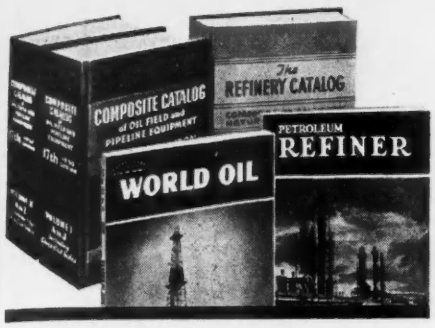

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Published every month except semi-monthly in February and July. Single copies 50 cents (except special issues). Subscription price: domestic and foreign, $2 a year; 2 years, $3; 3 years, $4. Advertising rates on application.
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PAUL PEEBLES RETURNS AS POLITICIAN

WORLD OIL readers of a generation ago will remember Paul Peebles, the Gulf Coast roughneck whose yearning for technical knowledge earned for him the self-endowed degrees of "PSGAOFE" (meaning "Petroleum Structural Geologist and Oil Finding Expert"). They will remember his oft-interrupted courtship of Cleopatra, daughter of his landlady in the old Goose Creek oil field. His "letters to "Cleo" used to appear pretty regularly in the old *Oil Weekly*.

Well, Paul has been heard from again, in a letter to the Publisher of WORLD OIL, and now Paul has joined the ranks of the politicians, enthusiastically, if not completely successfully. Here is his letter, reproduced as written:

"Dear Mr. Publisher:

"Things has come to a helluva note and if you ever hear of me running for offus on a platform of being agin lawyers, you needn't be surprised.

"Here I am up heer, a justice of the peace, in this new oil field town, and my girl, Cleopatra, down there in Goose Creek (I don't care if they did change the name to Baytown on account of it having a high-faluting sound), just a pining to be married to me, and me a getting up a good idear on how to get the money for a wedding trip—and a derned lawyer knocking the hole plan in the head.

"It was President H. Truman wich started the idear to working in my mind. I read in the paper about him taking a trip, with at least a part of his family, to the West, and it costing a quarter of a million dollars of the taxpayers' money more or less without the taxpayers telling him to do so, and quick as a flash I figgered up that on account of oil this heer precinct in wich I am justice of the peace has lots of money, and I am head knocker-top officer in the precinct, and like President Harry, I wood just take a trip at the taxpayers' expents, with Cleo meeting me in Santone and then we could go to Californy on our trip and I could make a few speeches from the back of the trane on the importance of the constabuls' doing what the justice of the peace tells 'em to do, all in the benefit of the taxpayers in general, and the Democratic party in particular, and Cleo and me with a nice trip all free to get married on.

"So I spoke to the county attorney and told him what I had in mind, and he says, quick like,

" 'You missuse the taxpayers' money that way and I'll put you so far in jail, they'll have to feed you black-eyed peas with a nigger shooter.'

" 'Well, wait a minute,' says I. 'President Truman ain't in no jail,' says I.

"And says he, 'Yes, and I ain't no attorney general of the U. S. A. neither.'

"So, that's a good idear gone. I thought anybody wood be as smart as Harry, but I guess I ain't!

Yours,
PAUL PEEBLES
PSGAOFE"

Ray L. Dudley

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The Changing Panorama

Bureaucracy versus Business

By WARREN L. BAKER, Editor

UNLESS DAMAGING attacks of government on successful business is stopped, a recession in jobs, production and national revenue is inevitable. Only prosperous businesses can provide jobs, production and tax revenue. The government cannot provide such things, for government can only give to the people that which it takes away from them in the present or borrows against their future.

Government forces, however, apparently are increasing their vicious, harassing attacks on American business. While no business seems to have a single friend in the executive branch and far too few in the legislative department of the federal government, recent events indicate the oil and gas industry has been singled out as one of the prime targets for such attacks.

Some of the recent actions of much concern to the petroleum industry include:

- Veto of the Kerr Gas Bill by the President.
- Proposal of the Treasury Department to reduce the percentage depletion tax allowance.
- The Department of Justice's suit charging seven major California companies with conspiring to restrain trade in violation of anti-trust laws.
- The consideration of matters relating directly to the petroleum industry by 18 different Congressional committees and subcommittees.
- President Truman's statement that there was "absolutely no justification" for recent gasoline price increases.

Widespread false, erroneous, misleading information and partial truths are being given the public in all these attacks.

For example, chief reason for the veto of the Kerr gas bill was that gas prices to consumers would increase if the government were prevented from regulating wellhead prices. The fact is that under previous free markets, natural gas prices at the well declined from 8.2 cents per thousand cubic feet in 1929 to approximately 6.7 cents in 1949, and that 1949 prices were only 2.0 percent above the 1935-1939 average while prices of all commodities advanced 88 percent during the same period. Quite to the contrary, extension of federal control over independent gas production is likely to retard expansion of gas operations and thus cause a reduction in the available supply which, in time, will boost prices to consumers.

As an additional example, the California trust suit was filed although a grand jury declined to return an indictment after 18 months of investigation. The companies are charged with conspiring to fix prices, whereas gasoline prices (exclusive of taxes) today are actually lower than they were 20 years ago although product quality has improved greatly and costs have risen sharply.

These developments mean that the petroleum industry is going to have its full share of trouble emanating from government policies and ideas. But it must be remembered that similar attacks are being made on other businesses at the same time. All American industry stands on trial.

These attacks represent a part of the growing, enveloping, stifling forces of collectivism, which jeopardize the survival of the economy system which has made possible the great American achievements.

Consequently, it behooves American industry more than ever before with the necessity of presenting the true facts to the public so as to awaken the people to their peril before it is too late to turn back.

America cannot survive and grow without successful businesses. Surely there is nothing wrong with a system which has permitted the U. S. to make more progress in the past 50 years than the rest of the world combined. To trade it for other less successful methods would be sheer economic insanity.

Reticence on the part of businessmen to talk openly and frankly only plays into the hands of the detractors of the American enterprise system. Apathy is the thing that may ruin us. You have to fight to win a battle—and a battle is raging today.

Industry Needs More Heating Oil Storage

ADDITIONAL STORAGE capacity for heating oil is an immediate need in the East and North to assure ample supplies at minimum cost for meeting peak demand of winter. This is the opinion of at least one major Eastern company, which is backing up its opinion by constructing substantial new storage capacity. The savings involved will result from elimination of need for excessive refining, transportation, and other facilities that would operate at capacity in winter but be idle in summer.

Emphasizing the need for this type of program as the most practical solution to the growing seasonal nature of the demand on the oil industry for its products, Stanley C. Hope, president of Esso Standard Oil Company, said that in the long run, peak demands of the consumer can best be met by building up inventories during the summer. He pointed out that the industry's prewar winter demand exceeded its summer demand by about 300,000 barrels per day. Currently, this difference has increased to 500,000 barrels daily.

Without adequate storage tanks near points of consumption, stated Hope, this huge increase in winter demand must be met by bringing into operation refining equipment and tank ships held idle through the rest of the year. This is a very uneconomical way of meeting winter peak demands, he said; and in addition, the delays in getting idle refiining equipment into operation or the seasonal delays in winter shipping schedules may cause a temporary shortage of supplies at East Coast consuming centers.

An essential part has been played by distributors in filling their own and consumers' heating oil tanks in the summer, said Hope. While these fill-up efforts have been reasonably successful and should be intensified in the future, he continued, they need to be supplemented by the building of additional tankage to care for the increase in seasonal load.

Report from the Observatory

Outlook Best in Two Years

By RAY L. DUDLEY, Publisher, and WARREN L. BAKER, Editor

SHARP IMPROVEMENT the past two months has put the petroleum industry in its best economic shape in approximately two years. With demand running much higher than anticipated, the future should witness firmer prices and higher production and refining rates. No troublesome problems are seen in current favorable conditions, although caution should be exercised in prevent runaway optimism from creating too excessive producing volumes in the coming months.

Despite substantially enlarged producing and refining rates the past 60 days, stimulated demand has resulted in very sizeable reductions in stocks of all major refined products. The combination of peak consumption and reduced storage volumes has strengthened prices to the point all previously existing danger to the market structure has dissipated, in direct contrast with the downward tendency of prices in March.

• • •

ESPECIALLY ENCOURAGING has been the rapid improvement of the gasoline situation, which was viewed with considerable anxiety only two months ago because of large inventory volumes. While these stocks still are 3 percent larger than a year ago, they have been declining at a much faster rate than in the corresponding period of 1949; and no longer are excessive since demand recently has been running 9 percent above last year.

In the seven weeks between April 1 and May 20, motor fuel stocks declined by 11 million barrels. This represented a daily average reduction of 224,000 barrels, whereas in the same period last year they were reduced by only 142,000 barrels per day. Consequently, mid-May found these inventories only 4 million barrels above 1949 volumes, although they had been 7¾ million barrels greater than year ago levels on April 1. It is very significant that gasoline stocks in the important marketing territory east of California have been reduced almost to 1949 levels, in contrast with being 3-1/3 million barrels larger on April 1.

The marked improvement in the gasoline picture caused an upward trend in prices in most of the nation's refinery markets during the past month. Oklahoma Group 3 prices for 80-octane motor fuel advanced from 9.38 cents per gallon in early April to 10 cents a gallon by mid-May, and Gulf Coast cargo prices for 83-octane climbed from 9.38 cents on March 20 to 10½ cents by May 15. These increases led to the strengthening of tank wagon prices over a large portion of the nation.

THE LOW LEVEL of distillate and residual fuel oil stocks was another factor lending much strength to the outlook.

Prolonged cold weather in the Northeastern and Midwestern sectors postponed the beginning of seasonal additions to distillate stocks, and as a result these inventories on May 20 were 15 million barrels below the same date of 1949 although they had been but 10 million under on April 1. The 39½ million in storage was only 3 million barrels above April 29 figures and compared with 90 million barrels at the start of the heating season the end of last October. East of California inventories of distillate fuel were 17¼ million barrels less than a year ago.

Residual fuel stocks the middle of May were 23½ million smaller than at the same time in 1949, as compared with being 17 million barrels under year ago levels on April 1. With half of the residual fuel stocks in the nation located in California, this commodity was in a very strong position in all other parts of the country.

• • •

BRIGHTENING THE OUTLOOK for producers have been recent gains in production allowables, especially in Texas and Louisiana, and promises of additional increases in coming months. Because of the large gain in demand and general low level of stocks, some observers expect production to equal the peak of 5,688,000 barrels daily of December, 1948, by the end of this year.

The industry, however, should guard against the repetition of conditions in 1948, when above-ground stocks were boosted to record volumes by overproduction.

Production in May was averaging around 5,100,000 barrels daily in contrast with 5 million barrels in April, and June output is likely to climb to 5,250,000 barrels per day. The latter would be the highest producing rate since February, 1949, and considerably above the recent low of 4,700,000 barrels in July of last year. Texas' allowable for June is 2,366,000 barrels daily, much larger than the 1,872,000 barrels of last July but still far below the peak of 2,717,000 barrels of December, 1948.

Despite increased output, crude stocks have remained at satisfactory levels. After increasing from a low of 239 million barrels on April 1 to 244¾ million barrels on April 29, they had declined to 241¾ million barrels by May 13. A year ago they totaled 274 million barrels.

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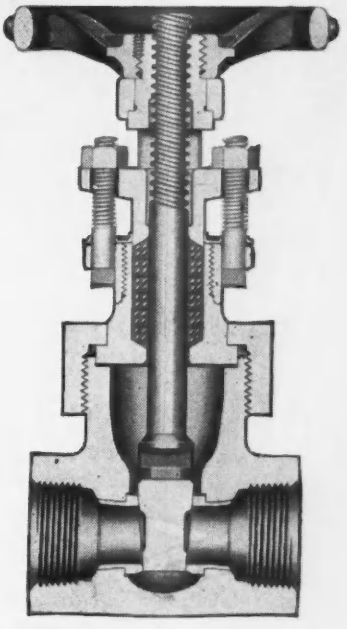

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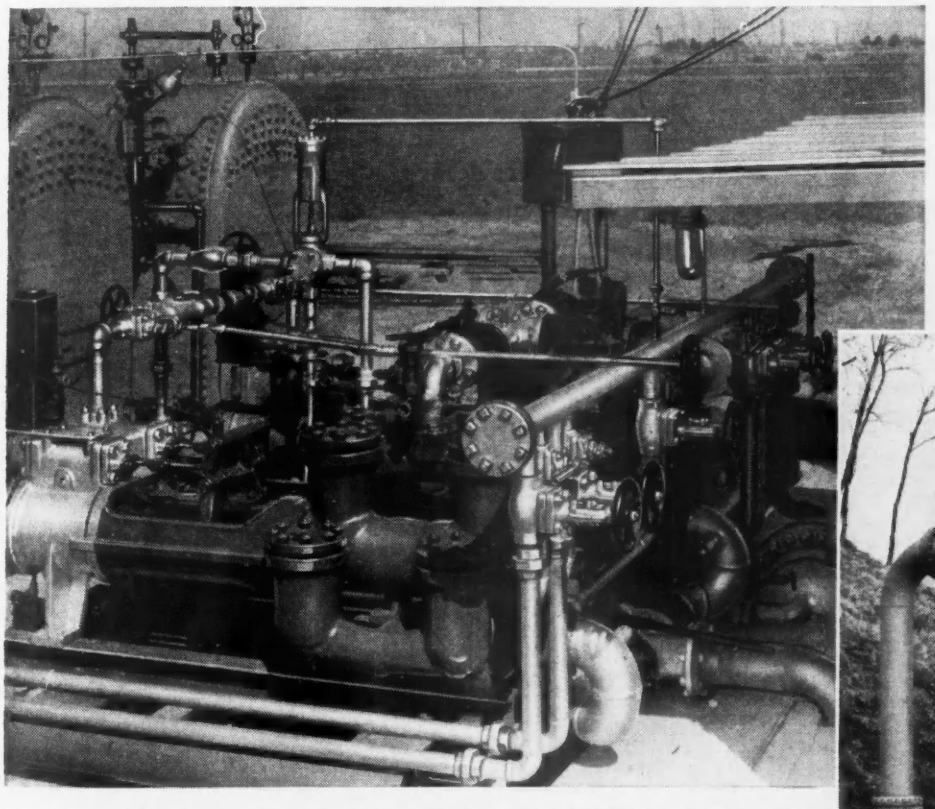

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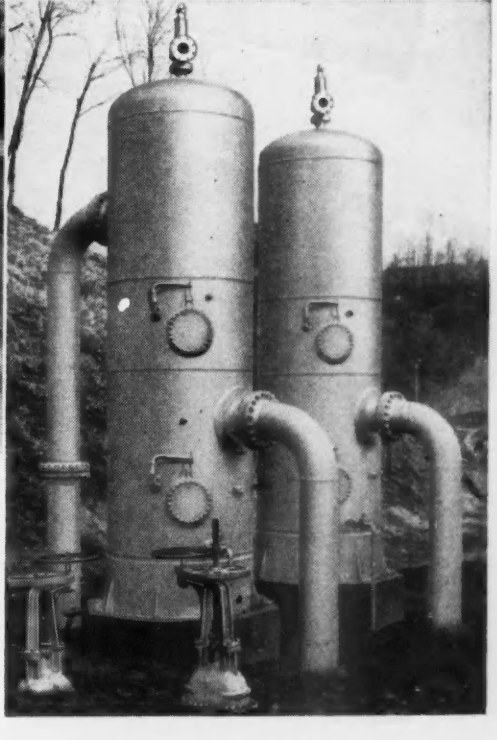

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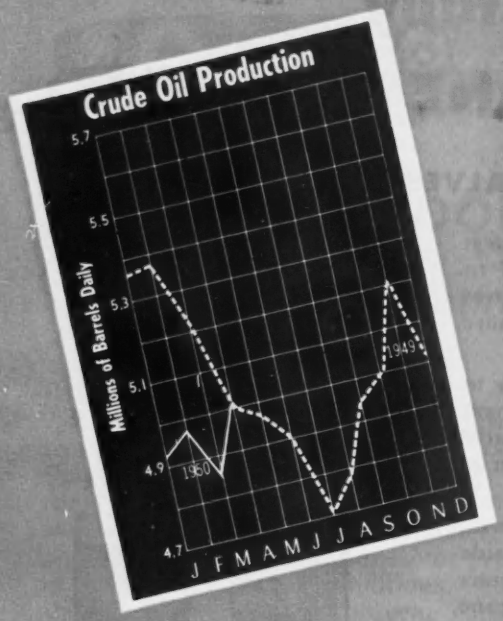
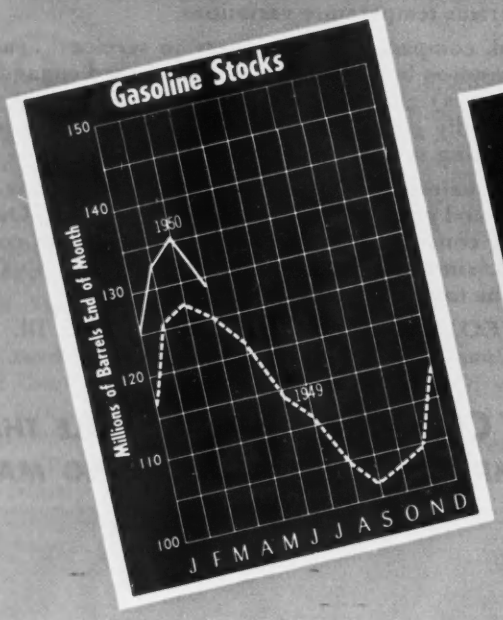
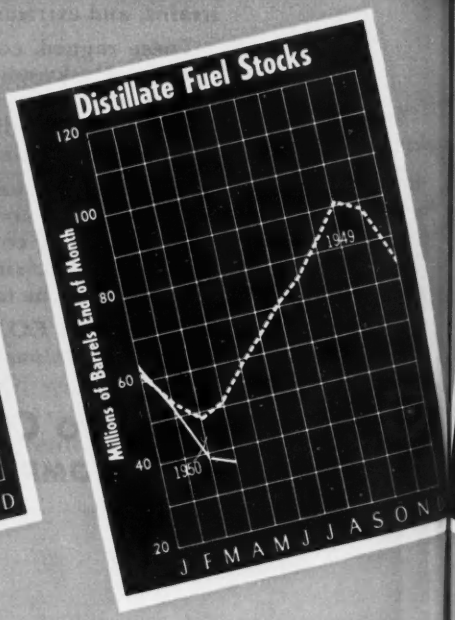
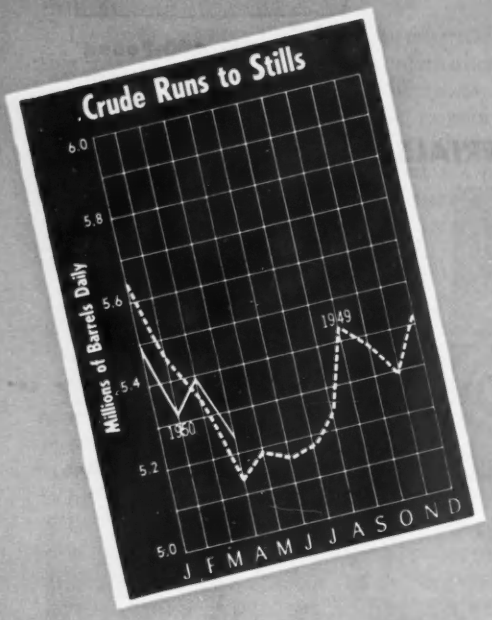
Petroleum

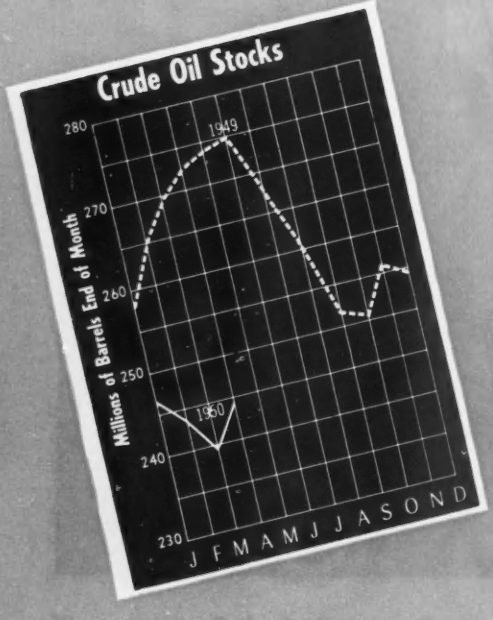
By CECIL W. SMITH
Statistical Editor







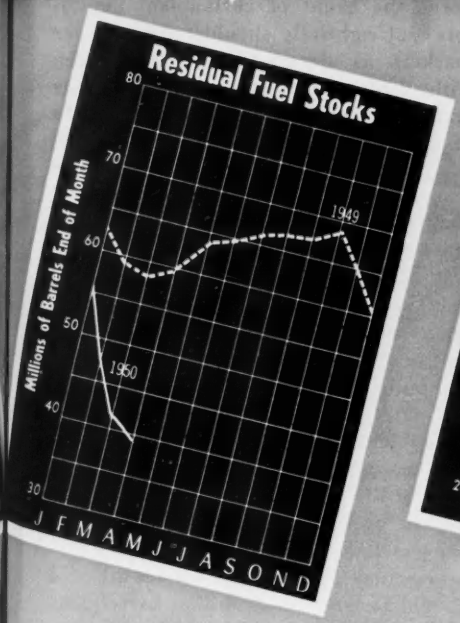


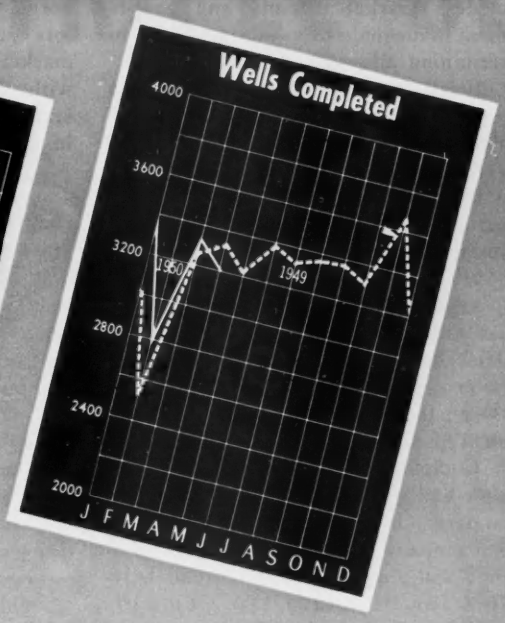


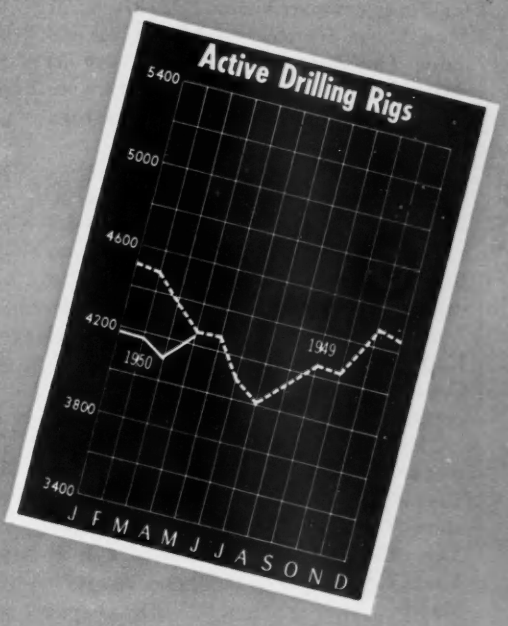
State Crude Oil Production
(THOUSANDS OF BARRELS)

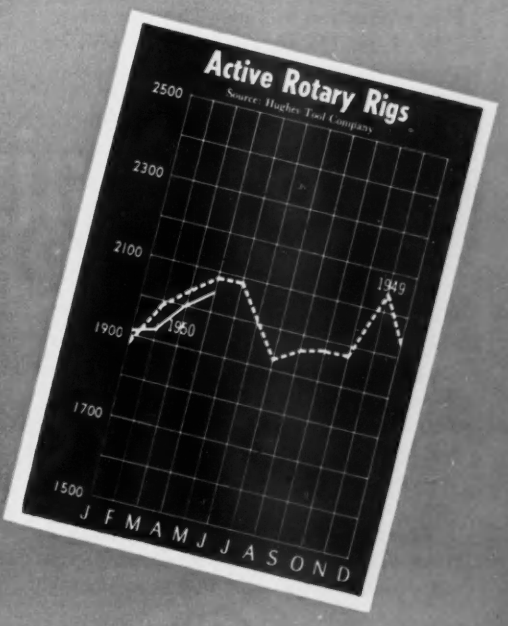
STATE or DISTRICT	DAILY AVERAGE PRODUCTION				TOTAL FIRST FOUR MONTHS		
	April, 1950	March, 1950	April 1949	% Diff. April, '49-'50	1950	1949	% Diff. '49-'50
Alabama	1.4	1.7	1.1	+ 27.3	190	146	+ 30.1
Arkansas	85.3	85.9	85.6	— 0.3	10,304	10,289	+ 0.1
California	859.1	863.3	942.3	— 8.8	103,617	113,382	— 8.6
Colorado	59.0	58.5	67.7	— 12.9	7,172	7,830	— 8.4
Florida	1.1	1.1	1.5	— 26.7	125	152	— 17.8
Illinois	180.9	181.4	174.9	+ 3.4	20,996	20,732	+ 1.3
Indiana	28.1	27.5	24.5	+ 14.7	3,153	2,756	+ 14.4
Kansas	268.5	262.3	290.9	— 7.7	32,401	34,997	— 7.4
Kentucky	25.8	25.5	22.8	+ 13.1	2,902	2,726	+ 6.4
Louisiana	535.2	531.4	519.7	+ 3.0	65,780	62,293	+ 5.6
North Louisiana	128.1	125.6	123.2	+ 4.0	15,021	14,757	+ 1.8
South Louisiana	407.1	405.8	396.5	+ 2.7	50,759	47,536	+ 6.8
Michigan	45.2	44.3	44.6	+ 1.3	5,365	5,476	— 2.0
Mississippi	99.1	100.6	109.5	— 9.5	11,873	13,277	— 10.6
Missouri	0.1	.....	0.2	— 50 0	8	15	— 46.7
Montana	21.6	20 7	27.2	— 20.6	2,522	3,042	— 17.1
Nebraska	1.5	1.5	0.7	+ 114.3	199	79	+ 151.9
New Mexico	124.5	127.9	131.2	— 5.1	15,399	16,016	— 3.8
New York	13.6	13.6	11.8	+ 15.3	1,592	1,444	+ 4.0
Ohio	9.3	9.0	9.4	— 1.1	1,099	1,111	— 1.9
Oklahoma	431 8	420.2	421.0	+ 2.6	49,803	51,033	— 2.3
Pennsylvania	29.5	27.9	32.4	— 8.9	3,551	3,898	— 8.9
Tennessee	.....	.....	.....	.....	8	2	+ 300.0
Texas	2,015.6	1,880.6	1,958.1	+ 2.9	234,335	263,337	— 11.0
Dist. 1—South Central	26.5	25.9	25.4	+ 4.3	3,134	3,216	— 2.5
Dist. 2—Middle Gulf	120.9	115.5	124.8	— 3.1	13,932	17,692	— 21.3
Dist. 3—Upper Gulf	366.6	333.7	382.7	— 4.2	43,614	51,978	— 16.1
Dist 4—L. Gulf-S.W.	193.3	184.2	189.6	+ 0.4	22,107	25,453	— 13.1
Dist. 5—East Central	33.6	23.8	36.2	— 15.5	3,559	5,035	— 30.1
Dist. 6—Northeast	343.1	323.3	345.1	— 0.6	38,474	46,678	— 17.6
Dist. 7-B—North Central	63.3	62.4	58.7	+ 7.8	7,534	7,429	+ 1.0
Dist. 7-C—West	53.0	49.9	42.8	+ 23.8	5,984	5,642	+ 6 1
Dist. 8—West	601.1	536.7	539.6	+ 11.4	68,637	74,635	— 8.1
Dist. 9—North	133.8	130.0	118.9	+ 10.0	16,016	15,671	+ 2.2
Dist. 10—Panhandle	83.4	83.2	87.7	+ 1.9	10,810	10,617	+ 1.8
Utah	3.1	2.7	0.3	+ 933.3	347	23	+1408.7
Virginia	0.1	0.1	0.1	.....	10	12	— 16.7
West Virginia	8.0	7.8	7.5	+ 6 7	941	880	+ 6.9
Wyoming	158 9	159 6	126.8	+ 25.3	18,772	14,982	+ 25.3
Total United States	5,033.3	4,855 1	5,011.8	— 0.1	592,365	629,900	— 6.0

nTrends in the U.S.









Crude Oil and Refined Products Trend

(THOUSANDS OF BARRELS)

MONTH	CRUDE OIL			GASOLINE		DISTILLATE FUEL		RESIDUAL FUEL	
	Production Daily	Runs to Stills Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month
1948:									
February	5,353	5,380	231,419	2,264	110,999	1,127	33,019	1,295	35,602
March	5,406	5,387	234,164	2,252	111,949	1,050	30,570	1,307	34,192
April	5,484	5,540	234,506	2,396	109,289	978	32,564	1,303	35,527
May	5,502	5,668	231,318	2,486	108,552	992	38,551	1,314	41,123
June	5,544	5,632	231,412	2,529	104,518	998	45,835	1,280	44,213
July	5,522	5,631	230,955	2,494	98,839	994	56,045	1,264	49,448
August	5,577	5,621	231,954	2,532	95,445	1,038	65,887	1,248	55,009
September	5,435	5,376	237,302	2,416	90,518	961	73,854	1,154	58,682
October	5,632	5,594	243,972	2,490	92,426	1,069	79,992	1,268	61,456
November	5,675	5,672	250,066	2,551	95,589	1,081	80,658	1,277	64,865
December	5,688	5,720	256,254	2,626	103,697	1,106	71,475	1,299	64,021
1949:									
January	5,365	5,641	258,648	2,538	116,621	1,063	61,584	1,348	62,508
February	5,376	5,480	265,216	2,484	126,054	1,004	53,937	1,282	59,398
March	5,224	5,352	269,341	2,470	127,443	993	48,923	1,258	58,190
April	5,012	5,141	272,520	2,494	125,351	846	51,231	1,147	59,668
May	4,972	5,195	273,912	2,585	121,602	813	57,442	1,138	63,576
June	4,903	5,162	274,691	2,597	114,041	771	64,730	1,041	64,628
July	4,704	5,173	267,586	2,613	111,217	835	71,553	1,040	66,084
August	4,780	5,241	260,585	2,593	104,879	902	76,037	1,078	66,843
September	4,940	5,427	251,689	2,617	101,799	1,002	83,213	1,110	67,117
October	5,997	5,373	250,932	2,643	103,287	1,001	90,643	1,141	68,673
November	5,210	5,293	256,010	2,594	104,707	962	88,212	1,180	65,112
December	5,024	5,475	253,356	2,633	111,521	1,032	75,207	1,203	60,193
1950:									
January	4,922	5,483	246,610	2,575	125,298	1,048	63,932	1,209	55,808
February	4,967	5,316	243,750	2,552	132,796	1,026	52,206	1,172	47,828
March	4,855	5,395	239,393	2,558	135,560	948	38,754	1,156	41,256
April	5,006	5,231	244,418	2,518	128,480	969	36,798	1,081	39,189
April, 1950 Change:									
In Month	+151	−164	+5,025	−40	−7,080	+21	−1,956	−75	−2,067
In Year	−6	+90	−28,102	+24	+3,129	+123	−14,433	−66	−20,479
Week Ended:									
May 13, 1950	5,118	5,427	241,770	2,609	125,851	1,025	38,139	1,101	39,255
May 14, 1949	4,955	5,216	274,035	2,701	122,071	832	52,476	1,217	61,993

Monthly News Analysis

Higher Allowables for June Reflect Improving Demand

Allowable crude production in Texas was substantially increased for June, after executives of most larger oil companies in the U. S. had indicated at the Texas statewide proration hearing at Austin May 17 that demand for domestic crude will increase and imports will continue around current rates in the latter half of 1950.

The Texas Railroad Commission authorized 19 producing days in June, a 30-day month, compared with 18 in May's 31 days. This will mean an allowable averaging 2,366,376 barrels daily for June, compared with 2,225,876 as of May 13, an increase of 140,500 barrels daily. This increase was authorized although purchasers' nominations were only 7500 barrels a day higher for June than for May.

The increase included raises in allowables in all Texas districts. Largest increase went to District 8 of West Texas, up 50,855 barrels daily. The East Texas field was raised 22,636; District 3 or upper Gulf Coast was up 23,285; District 2 or Middle Gulf Coast was raised 10,167; District 4, including Lower Gulf Coast and Southwest Texas, was increased 12,942.

The June order, together with other recent orders, will increase the Texas allowable more than 400,000 barrels daily above the low level reached in March. The order will largely restore cuts in East Texas and Gulf Coast fields in March.

Louisiana also will have higher allowable production in June. The new allowable of 591,135 barrels per day will be an increase of 51,218 daily over May. The bulk of the increase will go to fields of South Louisiana.

The Texas commission in its hearing had sought the opinion of major crude purchasers on the proposition of allowing the 19 days of production in June, and there was no serious objection from them, with one important exception. Hines H. Baker, president of Humble Oil & Refining Company, largest Texas crude purchaser, was less optimistic than others on the demand outlook and advised leaving allowables on the existing level at least for another month and waiting for more definite evidence of need for higher allowables.

The hearing that preceded setting of June allowables was of more than ordinary significance, as it had been planned in advance to bring out evidence regarding prospective demand for petroleum, U. S. imports of foreign oil, and the levels of U. S. stocks of crude oil, gasoline, and heating oil. The commission considers market demand and guards against inadequate or excessive stocks in determining allowable production.

Officials of 11 companies which do most of the oil importing offered figures indicating they expect to import 772,450 barrels per day of crude and products in the latter half of 1950, practically the same as in the first half of 1950 and substantially more than in the latter half of 1949. Other companies not included import about 68,000 barrels per day, indicating total imports of about 840,000 barrels daily in the latter half of 1950. The projected imports for latter half of 1950 are the same as for the first half for Gulf Oil Corporation, Socony-Vacuum Oil Company, The Texas Company; somewhat lower than in the first half for Standard Oil Company (N. J.), Shell Oil Company, and Cities Service Company; and somewhat higher than heretofore for Standard Oil Company (Indiana), Standard Oil Company of California, Sinclair Oil Corporation, and Atlantic Refining Company.

With one exception, officials of importing companies contended that imports are not excessive; that they are not seriously impairing the domestic industry; that they largely involve heavy crude and residual fuel oil needed to supplement domestic supplies; and that imports are supplementing and not supplanting U. S. oil.

Dr. Robert E. Wilson, chairman of Standard Oil Company (Indiana) differed, saying that imports were supplanting domestic oil. Importing company representatives told the commission that higher allowables in Texas would not cause curtailment of imports, as imports are based on long term contracts that must be fulfilled. Spokesmen for independents deplored failure of importers to plan reductions in imports and said they must give thanks to improving demand and not the importers for the higher allowables of June. Major company men warned that the imports problem should be worked out by the industry itself; that federal regulation of imports would invite broad control of industry affairs that would hurt independents as well as majors.

Ernest O. Thompson, member of the Texas Railroad Commission, in analyzing purchasers' forecasts of demand, foresaw the possibility that Texas fields might be allowed to produce 21 days by August, thereby putting out 600,000 barrels a day more than in March, the low point of curtailment. He said Texas had borne the brunt of curtailment heretofore and rightfully should regain former markets as demand improves. "Even with three more producing days," he stated, "we still would be producing less in a percentage way, reserves against production, than are some of our sister states."

At the time of the hearing, U. S. crude stocks totaled about 242 million barrels, and most of the witnesses expressed opinions that crude stocks would be adequate and not excessive between now and next September 1 at levels of 240 to 250 million barrels. There were substantial differences, however, in estimates of desirable levels for stocks of gasoline and heating oil next September 1, beginning of the winter season, when demand will be greatest for fuel oils and lowest for gasoline.

Gasoline stocks next September 1 should be about 102 million barrels, according to an average of 14 estimates, ranging from 90 to 120 million, including about 15 million on the West Coast and the remainder east of California. On April 1 of this year, the gasoline stocks might satisfactorily have been approximately 130 million barrels, it was indicated by the average of 14 estimates ranging from 115 to 135 million. These figures include about 15 million in California and the remainder east of California. Actual stocks of gasoline April 1 were 127 million barrels.

Distillate fuel oil stocks would be at satisfactory level next September 1 by totaling around 75 to 85 million barrels, including 65 to 75 million east of California, according to several typical estimates. On last April 1 these stocks might satisfactorily have been 30 to 45 million barrels, including 30 to 35 million east of California, the same sources estimated. Actual stocks April 1 were about 38 million barrels.

Oil Control Efforts Feared Following Veto of Kerr Bill

In the oil industry there is much anxiety over the possibility that there will be efforts to extend federal controls over both gas and oil, following veto of the Kerr-Harris bill.

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was the statement on the subject by President Hines H. Baker, to stockholders of Humble Oil & Refining Company at their annual meeting.

An important problem for the future has been created, said Baker, by the veto of the bill, which would have clarified the Natural Gas Act, as recently construed by the Supreme Court, by providing that arm's length sales of gas by independent producers and gatherers are not subject to government price control. The original Natural Gas Act, passed by Congress in 1938, provided that the Federal Power Commission's authority should not apply to the production or gathering of natural gas, and as late as 1947 the commission itself adopted an order in which it ruled that regulation of price would not be applied to arm's length sales by producers. Subsequently, however, a majority of the commission indicated that if not restrained by Congress, they would seek to exercise price-fixing authority over sales of gas to interstate lines for resale.

"The production of natural gas is not a utility business," Baker asserted. "Totally unlike the public utility business of transporting gas, it is a highly hazardous and risk-taking venture. Four out of every five exploratory wells drilled are dry holes. If utility regulation is applied to gas production and the price at which gas is sold in the field fixed, then the incentives to discover new reserves will be inadequate to furnish the nation with sufficient supplies.

"The fact that gas prices have remained low relative to the prices of other fuels is ample proof," declared Baker, "of the competition existing among gas producers in the principal supply areas. If by imposing utility regulation the commission should hold field prices of gas to their present levels, which are lower than the relative prices of coal and fuel oil, the result will be to disrupt the operations of industries supplying competitive fuels. Fixing the price of gas in the hands of producers would pose a threat that similar action will be taken to fix the price received by producers of other competitive fuels."

L. F. McCollum, president of Continental Oil Company, in a letter to stockholders May 15, stated that veto of the Kerr-Harris bill gives cause for much concern to those interested in the continued growth of the petroleum and natural gas industries. "The veto . . . was a serious blow to producers and gatherers of natural gas who have no affiliation with companies engaged in the transportation or sale of natural gas in interstate commerce," said McCollum.

"The chief reason given for the veto of the Kerr bill (which would have removed any doubt about the right of the independent producer to continue to sell natural gas in a free market) was the fear that gas prices to the consumer would rise," he continued. "The fact is that the retail price index for gas in 1949, natural gas having been more than 85 percent of the total volume of all gas sold in that year, has risen less than 3.5 percent from the 1935-1939 average, while the Department of Commerce all-commodity retail price index has increased 88 percent during the same period. The well-head price of natural gas over the past 20 years, 1929 to 1949, has actually declined from 8.2 cents per thousand cubic feet to about 6.7 cents.

"Federal control, if extended over independent production and gathering of natural gas," continued McCollum, "may well have the effect of reducing the supply of gas available for interstate users because independent producers of the commodity will be extremely reluctant to effect any expansion of their operations and to transport or sell in interstate commerce the gas now being produced. Shrinkage in the supply of gas available for sale or movement in interstate commerce may increase the price of gas to the consumer." Federal control over gas would be a threat to oil operators, said McCollum, because gas frequently is produced along with oil.

At the mid-year meeting of the Independent Petroleum Association of America at Los Angeles May 8 and 9, the natural gas committee recommended that the association and all its members vigorously and aggressively continue all efforts to secure such legislation as may be necessary to clarify fully the Natural Gas Act and by such clarification bar any effort of the Federal Power Commission to assume jurisdiction over the production and gathering of natural gas. The committee suggested further that in spite of the veto of the Kerr Bill, oil and gas producers should resist any effort of the FPC to assert authority over independent producing and gathering of gas or oil, since the Natural Gas Act, even as it stands, prohibits this.

National Interest Shown in Problem of High Oil Imports

Government intervention is being mapped to solve the petroleum industry's current greatest headache—what to do about oil imports. The White House and the Interior Department have conferred and agreed that action by industry itself is the best solution, but if that fails, then legislation or quota imposition likely will follow. Interior Secretary Chapman has called on the industry for suggestions as to how to handle the import dispute, and is clearing the ground for a conference of all oil importers on the problem. Chapman is ready to ask the Justice Department for clearance so the companies can concertedly act on import cutbacks without fear of later anti-trust suits. But if with that protection the companies still fail to limit oil shipments into this country, then the Interior Department may propose import quotas.

If government action results, it may develop into congressional direction. The Independent Petroleum Association of America is urging legislative action on three alternative proposals: (1) a quota plan; (2) a boost in oil tariffs; (3) a balance between exports and imports on a volume basis.

Imports of crude and products for the first quarter of 1950 averaged 800,000 barrels daily; for March, 865,000.

The State Department of the U. S. has announced its opposition to any measures to limit imports of oil.

Officials of importing companies were called upon by two important sources for statements regarding their plans for future imports. Prior to the IPAA's Los Angeles meeting, that association wired the importers for statements, and replies generally defended current rates of imports and denied that imports were supplanting domestic oil, damaging the domestic industry, or retarding search for new domestic reserves. The large companies also cautioned that the oil industry itself should solve its problems, including the imports situation, instead of inviting federal government intervention. Majors asserted they held heavy interests within the U. S. and were as anxious as independents to keep the domestic industry in a healthy state.

At the statewide hearing of the Texas Railroad Commission in Austin May 17, officials of importing companies again defended their import rates. They provided figures on their plans for imports in the latter half of 1950. In the aggregate, these projected imports are virtually the same for the latter half of 1950 as in the first half of the year.

In Oklahoma City, Amarillo, Texas, and Santa Fe, N. M., Mid-Continent oil men told a touring Congressional subcommittee of the House Small Business Committee that oil imports must be curbed within reason or the domestic oil industry will face a real crisis. Producers claimed the eastern refiners were processing cheap imported oil at expense of southwestern oil. Stripper well operators told the committee that if the market for crude oil breaks only 50 cents per barrel, they will be compelled to abandon thousands of acres which contain millions of barrels of oil recoverable only under a fair price structure. Once abandoned, the oil will forever be lost to the nation, they asserted. Tax officials

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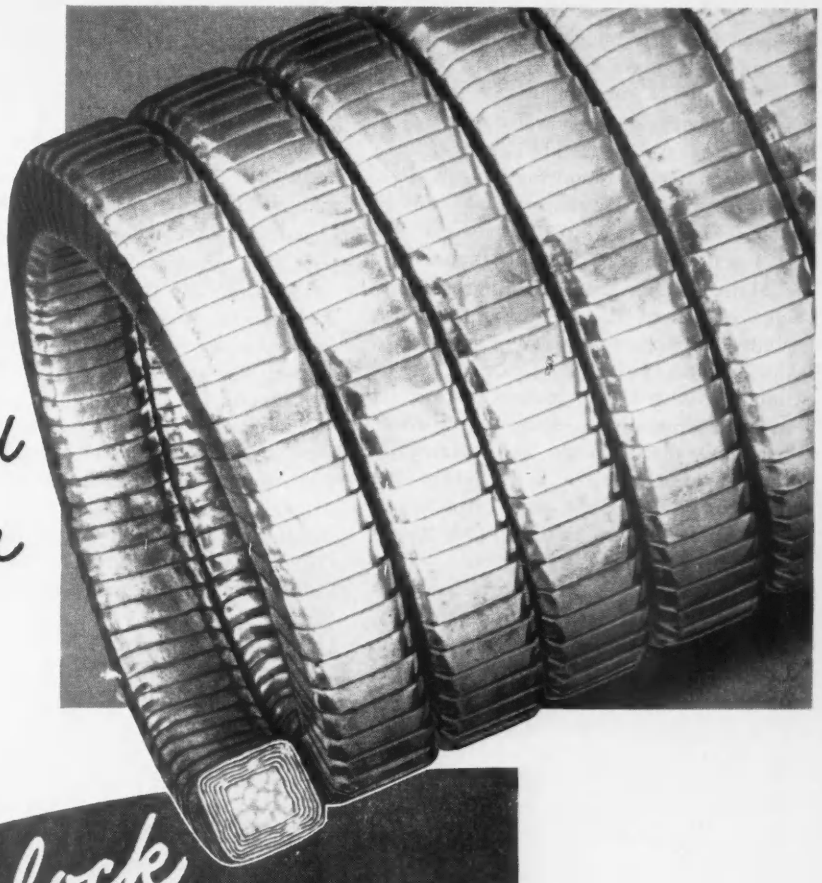

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feared for their budgets, as less oil sold means less taxes to run state, county and municipal governments.

The hearings were welcomed by oil men but they are frankly skeptical as to the ultimate good that may result. Few congressmen understand the oil industry and the Truman veto of the Kerr Bill still rankles among oil and gas men.

Many oil operators attending the hearings expressed the feeling that federal control of imports is not the solution to the problem. In their opinion, the solution lies with the importers, who must in the interest of the industry as a whole recognize the situation and voluntarily restrict imports to a point where the menace to the entire price structure—both crude oil and refined products—is removed.

The clamor over oil imports has been so loud as to attract attention generally, and not only within the industry and in Congress, as evidenced by an editorial on the subject in the *Saturday Evening Post* of May 20. That magazine criticized the independents' demands for quotas or prohibitive tariffs; deprecated the idea of eliminating the competition of foreign oil by legislation; said Venezuela spends more dollars for U. S. goods than it receives for goods sold to the U. S.; and is one of America's best customers other than Marshall Plan countries, buying large amounts of machinery and other products, without benefit of ECA dollars; and added that in an emergency, Latin-American oil would not be "foreign oil" but vitally needed "Western Hemisphere" oil.

In discussing a statement he had filed with the Oil Imports (Keogh) subcommittee of the House Small Business Committee, Eugene Holman, president of Standard Oil Company (N. J.), declared that the tariff of $1.05 a barrel on oil imports proposed in Congress would be so high as to represent an embargo and that a quota system for regulating imports would lead inevitably to government control of oil. Of the two proposed controls, he said the quota system would be the most unworkable. He included a reference to the coal interests' demands for curtailment of oil imports and said that "no action should be taken which would unnecessarily burden American consumers, simply to shield one segment of the fuel industry from competition or normal economic evolution."

At the congressional hearings in Washington, restrictions on oil imports were advocated vigorously by representatives of the United Mine Workers, the National Coal Association, and railroad interests, who declared that imports of cheap fuel oil were destroying markets for U. S. coal, sharply reducing railroad hauling of coal, and throwing coal miners and railroad men out of work.

California Anti-Trust Suit May Hasten State Proration

The vicious anti-business trend of government continues. Again, business, seemingly because it is big business, finds itself under attack by the Justice Department on charges of alleged monopolistic practices.

This time, the charge is leveled at the oil business; specifically, at seven major California oil companies and the state's long-established voluntary oil conservation committee.

Named as defendents in the civil anti-trust suit, filed May 12 by the Justice Department in Federal Court in Los Angeles, are General Petroleum Corporation, Richfield Oil Corporation, Shell Oil Company, Standard Oil Company of California, The Texas Company, Tide Water Associated Oil Company and Union Oil Company. Also named is the Conservation Committee of California Oil Producers, the state's voluntary conservation organization under which the majority of the state's oil operators, major and independent alike, have sought to regulate crude production at a level that is within the maximum efficient rate of production.

The government alleges that the seven oil company defendants have controlled production, transportation and marketing of petroleum and its products to eliminate competition by independent producers, refiners and marketers. They are accused of refusing use of their pipe lines to the independents on the same terms as available to one another. In addition, they are charged with fixing prices at both wholesale and retail levels, of refusing to sell to price cutting companies and to those wholesalers or retailers who refuse to sell excusively the produces of one of the majors.

The Conservation Committee of California Oil Producers was attacked on grounds that is a private proration system operated by the majors for their own benefit although applicable to their independent competitors as well as to themselves. The committee also was charged with fixing production quotas for independents at such low levels as to deprive independent refiners of sufficient crude to meet normal requirements.

Oil company spokesmen were quick to make vigorous denials of the government's charges. Branding the charges as "ridiculous" and "absolutely groundless," some of the spokesmen made it clear that the suit would be fought with all the strength at their command.

T. S. Petersen, president of California Standard, in commenting on the suit, pointed out that the charges "apparently are based on an 18-month investigation by a special federal grand jury in Los Angeles which declined to return any indictment. This grand jury, which was discharged a year ago, examined in detail a great mass of records subpoenaed from the major western oil companies, including Standard Oil Company of California. Obviously the grand jury concluded that there was no basis for an indictment against this company."

Perhaps the bitterest of all comments made by the defendant oil companies was by Reese H. Taylor, president of Union Oil Company. "This type of suit," he said in part, "is the reward that any industry that has served the people of this country honestly and well can expect from the radical and socialistic planners of the 'Fair Deal.' If there is any monopoly in this suit, it is a power-hungry, monopolistic government attacking a highly competitive industry simply because some of the companies in the industry have grown large by providing outstanding service to the people.

"There is no oil monopoly here in the west and the government anti-trust division knows it.

"The social planners," Taylor concluded, "want to blacken successful industry so they can act as knights in shining armor. But they know, as we know, and the people know, that high-sounding promises do not provide jobs; that the destruction of successful industries does not provide pay rolls, and that all the oil industry can honestly be charged with is having successfully served the people."

It is believed that, because of the great amount of testimony that will have to be taken and the amount of work and time required by the companies to prepare their defense, the suit may not reach the courts for from 1½ to 2 years.

Filing of the suit attacking the voluntary proration system, is expected to hasten the enactment of a state oil conservation law in California. Such legislation previously had gained strong support from independent operators as well as larger companies. Members of the Oil Producers Agency of California, the organization for voluntary proration, have denied the federal government charges that the agency promoted monopoly. But leaders in the organization stated that the suit emphasizes the urgent need to replace voluntary proration with a state conservation program, such as those existing in other leading oil producing states. While the federal government seeks to outlaw the California voluntary proration, it was pointed out, there is also a threat of the adoption of a federal conservation law to apply in those oil-producing states which have no such law of their own. Thus there is a possibility that California may have to submit to federal controls unless it establishes state regulations.

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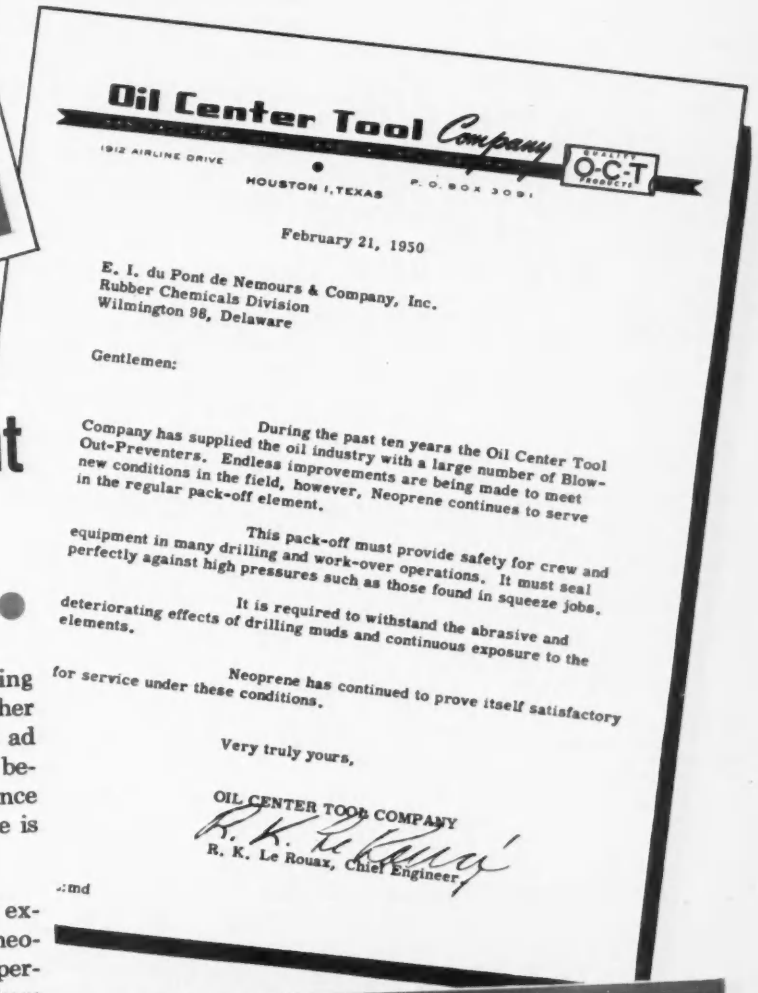
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During the past ten years the Oil Center Tool Company has supplied the oil industry with a large number of Blow-Out-Preventers. Endless improvements are being made to meet new conditions in the field, however, Neoprene continues to serve in the regular pack-off element.

This pack-off must provide safety for crew and equipment in many drilling and work-over operations. It must seal perfectly against high pressures such as those found in squeeze jobs.

It is required to withstand the abrasive and deteriorating effects of drilling muds and continuous exposure to the elements.

Neoprene has continued to prove itself satisfactory for service under these conditions.

Very truly yours,

OIL CENTER TOOL COMPANY

R. K. Le Rouax, Chief Engineer

:md

. . . brings this comment Today . . .

★ The Oil Center Tool Company had been using neoprene for their blowout preventers and other equipment for some time when the above ad appeared in 1939. They chose neoprene because of its qualities, backed up by experience from *grueling use in the field*. And neoprene is still living up to these field conditions.

★ When you need rubber to meet the most exacting requirements, investigate Du Pont neoprene. Its combination of outstanding properties provides resistance to deterioration from contact with acids, alkalis, oils, grease and most chemicals. And what's more, neoprene withstands exposure to weathering, sunlight, extreme temperatures, abrasion and constant flexing. These and the many other advantages of Du Pont neoprene assure long, trouble-free service life in any product where neoprene is used. Specify it for your equipment needs. While Du Pont does not make any finished products of neoprene, we'll be glad to put you in touch with a supplier. Write to E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division K-6, Wilmington 98, Delaware.

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Completions

Hold Lead Over 1949 Period

THERE was a decrease in the number of wells completed in April as compared with March, but still the year's total continued to hold a lead over wells drilled in the comparable period of 1949. However, the slackening during April narrowed this lead over last year's operations, and if current rates continue, the leadership will change hands and the year's end will find 1950 activity trailing slightly as estimated by WORLD OIL in its Review-Forecast Issue.

April's well completions totaled 3210 for a drop of 140 wells from March's 3350, and 128 less than were completed in April of last year. Actually, the decrease in April's activity was slight in comparison with March's operations. On a daily average basis, April recorded 107 wells a day while March's average was only 108 wells. However, a year ago the daily average had been 111 completions.

A comparison of wells completed in this year's first four months with those finaled in the same period of 1949 showed that the current period held a 4.8 percent advantage, but that lead was rapidly being shortened. At the end of March, the increase amounted to almost 8 percent, while a month before that it had totaled 11.6 percent.

This year's footage continued to enjoy a lead over last year's. So far, 47,110,100 feet have been drilled, which was an increase of almost 3 million over last year's 4-month total and that amounted to a gain of 6.7 percent.

Well Completions in the United States During April, 1950, and Cumulative for Year

(Figures compiled by WORLD OIL Staff from private reports and other sources as follows: Illinois from Illinois Geological Survey; Indiana from Indiana Division of Geology; Missouri from Missouri Geological Survey; Tennessee from Tennessee Division of Geology; Bradford, Kane-Clarendon and Allegany fields of Pennsylvania and New York from the *Producers Monthly*)

STATE or DISTRICT	MONTHLY COMPLETIONS, APRIL, 1950									TOTAL COMPLETIONS				CUMULATIVE TOTAL				Rigs in Operation (Drilling, Rigging Up and Shut Down)		
	NEW WELLS								Total Drilled Deeper											
	Oil	Dist.	Gas	Dry	Water Input	Gas Input	Water Disposal	Total New		April, 1950	Mar., 1950	April, 1949	Footage April, 1950	Wells 1950	Wells 1949	Percent Diff.	Footage 1950	April 30, 1950	Mar. 31, 1950	April 30 1949
Alabama	1			1				2		2	3	4	6,776	10	6	+ 66.7	33,496	4	1	3
Arizona															3	—100.0		4	5	6
Arkansas	18		1	9				28		28	32	27	88,574	118	87	+ 35.6	378,498	20	22	32
California	95			35				130	11	141	148	204	530,033	597	872	— 31.5	2,397,783	225	194	256
Colorado			1	7				8		8		4	36,318	15	13	+ 15.4	55,593	11	14	21
Florida											2	1		6	8	— 25.0	41,116	3	1	3
Georgia											1	1		2	3	— 33.3	9,075			1
Idaho			2					2		2	1		4,728	3			8,540	2	2	
Illinois	67		1	86				154		154	145	183	328,747	607	622	— 2.5	1,198,380	207	171	257
Indiana	50			67			1	118		118	112	75	207,765	417	302	+ 38.1	723,758	180	150	134
Kansas	149		18	121			4	292		292	280	215	936,267	1,080	854	+ 26.5	3,526,263	292	269	312
Kentucky	34		24	31		1		90		90	75	62	161,421	285	276	+ 3.3	531,475	98	85	83
Louisiana	119	17	21	47			1	205		205	178	141	1,360,248	763	600	+ 27.2	4,810,406	221	238	195
North Louisiana	57	5	16	24			1	103		103	93	76	382,286	380	290	+ 31.0	1,409,924	57	67	52
South Louisiana	62	12	5	23				102		102	85	65	977,962	383	310	+ 23.5	3,400,482	164	171	143
Maryland											1			1			3,612	1	1	
Michigan	26		2	26				54		54	58	76	126,871	233	295	— 21.0	575,863	138	132	103
Mississippi	9	9		18				36		36	33	30	267,886	124	113	+ 9.7	924,592	29	32	31
Missouri	1		2	2				5		5	7	3	2,006	17	5	+240.0	11,673	5	9	6
Montana	8		6	11				25		25	15	22	54,618	57	66	— 13.6	182,283	17	16	38
Nebraska	1		1	3				5		5	6		21,290	21			84,099	2	4	1
New Mexico	39		1	9				49	4	53	42	61	250,914	199	186	+ 7.0	931,860	68	71	93
New York	24				17			41		41	45	90	57,929	216	473	— 54.3	304,538	76	78	121
North Dakota																				1
Ohio	25		19	24				68		68	75	83	147,614	279	346	— 19.4	614,436	138	137	141
Oklahoma	248	6	14	147	1	1	2	419	6	425	424	428	1,441,377	1,625	1,316	+ 23.5	5,597,625	540	553	482
Pennsylvania	42		26	4	36	8		116	2	118	116	173	208,304	475	807	— 41.1	868,485	203	191	291
South Dakota														1			5,710			1
Tennessee												3		1	9	— 88.9	1,430	8	8	9
Texas	811	21	23	386	1		4	1,246	20	1,266	1,463	1,339	5,300,679	5,212	4,516	+ 15.4	21,935,481	1,401	1,407	1,245
Dist. 1—S. Central	14			14			2	30	1	31	45	52	90,103	143	201	— 28.8	414,840	29	30	44
Dist. 2—Middle Gulf	21	5		19				45		45	53	80	233,508	176	216	— 18.5	1,015,003	59	56	46
Dist. 3—Upper Gulf	79	4	5	44				132	1	133	138	113	736,624	499	436	+ 14.4	2,849,315	140	117	144
Dist. 4—Lower Gulf-SW.	74	12	1	47				134	2	136	149	120	638,178	524	510	+ 2.7	2,455,576	122	113	101
Dist. 5—East Central	7			6				13		13	13	30	45,965	52	91	— 42.8	233,483	27	27	17
Dist. 6—Northeast	11		2	4				17		17	61	64	107,907	181	303	— 40.3	855,782	33	33	34
Dist. 7-B—N. Central	67			84				151	1	152	174	202	438,841	607	610	— 0.5	1,849,557	142	150	164
Dist. 7-C—W. Central	36			21				57	2	59	88	50	245,274	276	111	+148.6	1,148,768	78	86	51
Dist. 8—West	285		1	37	1			324	11	335	338	279	1,774,141	1,295	863	+ 50.1	6,905,792	470	499	397
Dist. 9—North	148		1	103			2	254	2	256	344	243	717,573	1,121	789	+ 42.1	3,137,329	200	192	129
Dist. 10—Panhandle	69		13	7				89		89	60	106	272,566	338	386	— 12.4	1,070,036	101	104	118
Utah	1							1		1	2	2	4,229	7	11	— 36.4	23,312	8	8	16
Virginia																		1	1	
Washington	1							1		1	1		9,344	2			16,032		1	
West Virginia	9		15	7				31	1	32	53	37	85,827	192	154	+ 24.7	463,005	275	261	284
Wyoming	33			7				40		40	32	74	193,071	171	207	— 17.4	851,681	47	52	99
Total U. S.	1,811	53	175	1,050	55	10	12	3,166	44	3,210	3,350	3,338	11,832,836	12,736	12,150	+ 4.8	47,110,100	4,224	4,114	4,265

Looking Ahead

OIL INDUSTRY must continue on guard against new threats of cut in depletion allowance and other unfavorable government actions, leaders warn, despite fact House Ways and Means Committee by substantial majority voted against cutting allowance from 27½ to 15 percent, as President Truman demanded. Depletion allowance is not well understood by public, they point out, and industry must fully explain necessity of allowance in interest of public as well as the industry.

MORE HEATING OIL STORAGE will be built in East and Midwest. This is considered best and most economical way of meeting problem that oil demand is materially greater in winter than in summer, due to heating oil use. Without adequate storage, high winter demand must be met from current operations, and extra facilities required are idle in summer. Equipment for producing, refining, and transporting each extra barrel per day of capacity costs about $4500, and extra facilities for meeting winter demand would involve more than $1 billion. Winter needs can be met with less equipment if operated fully in summer, with fuel oil going to storage. This requires more storage, but investment involved country-wide would be less than $100 million.

INCREASED USE of underground storage for natural gas near consuming areas of Northeast and Midwest may be expected. This will help meet heavy winter demand. In line with this idea, two major gas transmission companies are seeking FPC permission to acquire and operate an underground gas storage field near Westmoreland City, Penn. Largest of its kind in U. S., the storage field will hold 105 billion cubic feet, including 45 billion base and 60 billion for storage in summer and withdrawal in winter.

BILL FOR FEDERAL QUITCLAIM to tidelands oil has reached House of Representatives Rules Committee, which controls flow of bills to House floor. Representative Ed Gossett, Democrat, Texas, one of sponsors, predicts passage this session. Bill was approved by House Judiciary Committee 18 to 8. Majority report declared passage of bill is necessary to settle controversy between states and federal departments over tidelands ownership.

PIPE LINE SYSTEMS are contemplated for supplying fuel to planes at large airports. Because of ever-increasing demand for aviation petroleum products, pipe line systems may be substituted for tank truck refuelers. Aviation technical service committee of API's division of marketing is cooperating with airlines in analyzing future fueling requirements, making numerous inspections and careful engineering investigation of equipment available for handling aviation petroleum products, from storage to dispensing into aircraft. Committee is endeavoring to determine safest, most efficient, and most economical refueling methods.

CALIFORNIA HAS and will continue to have adequate crude supplies to meet Pacific Coast needs, but West Coast industry must progressively adjust itself to changing demands for products, according to T. S. Petersen, president of Standard Oil Company of California. Refiners cannot continue to turn out heavy fuel oil for which there is a diminishing market. They must meet the needs of a growing consumer market for such products as gasoline and diesel fuel. Some refiners have actually started conversion of plant facilities for this purpose, he said, and others have made plans in this direction.

Let the People Know:

Free Enterprise System in

An interview by **HENRY OZANNE**
Eastern District Editor
with **ROBERT G. DUNLOP**
President, Sun Oil Company

EDITOR'S NOTE: *The accompanying interview with Robert G. Dunlop, president of Sun Oil Company, is the first of a series in which* WORLD OIL *will present the opinions of some of oildom's best minds on problems of vital concern to our industry, nation, and civilization.*

The topic, "Free Enterprise," was chosen because of the ceaseless din in Washington as the forces of disguised socialism chip away at this cornerstone of our democracy. And having chosen the topic, the choice of the man was inevitable. Robert Dunlop is not only a militant proponent of free enterprise; he is a symbol of free enterprise—which is to say, of Americanism. Only America could produce this biography: Born in Boston, attended public schools, won a scholarship and became a Certified Public Accountant. Joined Sun in 1933 and became assistant comptroller, comptroller, board member, then, three years ago, president. His orderly life allows time to shoot good golf, to be a Boy Scout council director and an elder in the Presbyterian Church.

Q. *Do you feel that our traditional free enterprise system is in danger?*

A. Yes, and I do not consider myself an alarmist. Many people are advocating policies that chip away at the very foundations of our individual competitive enterprise system. Unfortunately, these people include not only recognized collectivists or well-meaning but starry-eyed reformers, but they include many men and women who are possessed of ability, leadership and social conscience who are wielding great influence. It is this persistent chipping away at our foundations that causes me the greatest concern. What many of these sincere, though misguided, people fail to realize is that the measures they advocate represent merely another way station on the road to the total state.

Q. *Why do you think these substantial men and women favor collectivist proposals?*

A. Only because they do not have an understanding of the manner in which our competitive enterprise system functions to serve their best interests. That, I must add, is primarily the fault of business leaders.

Q. *If you were asked to name one government policy that poses the greatest single threat to the American competitive enterprise system, which one would you name?*

A. A loose monetary policy, if permitted to continue, would do more damage to our economy than any other factor I can think of. Monetary inflation has already reached a danger point in this country. Its root has been the injection of increasing quantities of money into circulation by a process which has been just one step short of a printing press operation. Behind that, of course, is continued deficit financing. Responsibility lies solely with the government. Increased physical output from our factories, mines and farms will help curb inflationary forces, but increased productivity is not enough to off-set constant cheapening of the dollar. Until our representatives in Washington recognize the harm they are doing to the nation's future by their unsound fiscal management, the threat of uncontrolled inflation will continue to loom before us.

Q. *How do these inflationary policies affect the petroleum industry?*

A. Inflation creates a whole set of artificial conditions. When the supply of money increases at a rate faster than the supply of goods, the price of goods goes up. High prices create seemingly high profits. Normal yardsticks, including the dollar itself, are distorted. Planning for the future is both difficult and hazardous. For example, immediately after the war, we planned a wax plant at our Marcus Hook refinery, which we estimated would cost in the neighborhood of $5 million. Due to inflated construction costs that plant has cost us in the neighborhood of $9 million. Many other oil companies, I am sure, had similar experiences in expanding plants and facilities.

Q. *Does that mean that the money you set aside over the years to replace worn-out plants is now inadequate to cover this expense?*

A. Exactly. Depreciation allowances recognized by the Bureau of Internal Revenue, based upon the original cost of plant construction, are grossly inadequate to provide for replacement at today's costs. Today, management discovers that the new plants cost two or three times the original cost of the plants they are to replace. This is a serious problem for all industry, but especially serious for petroleum, where capital investment per employe and per dollar of annual sales is substantially greater than in other industries, such as steel, rubber and automobiles.

Q. *Is there any particular bill or proposal before Congress that would give the government complete control over the petroleum industry?*

A. I don't know of any that go so far. Even if there were, I don't think such a bill would be taken too seriously right now. In fact, I don't think any established American industry will fall under

DANGER

ROBERT G. DUNLOP

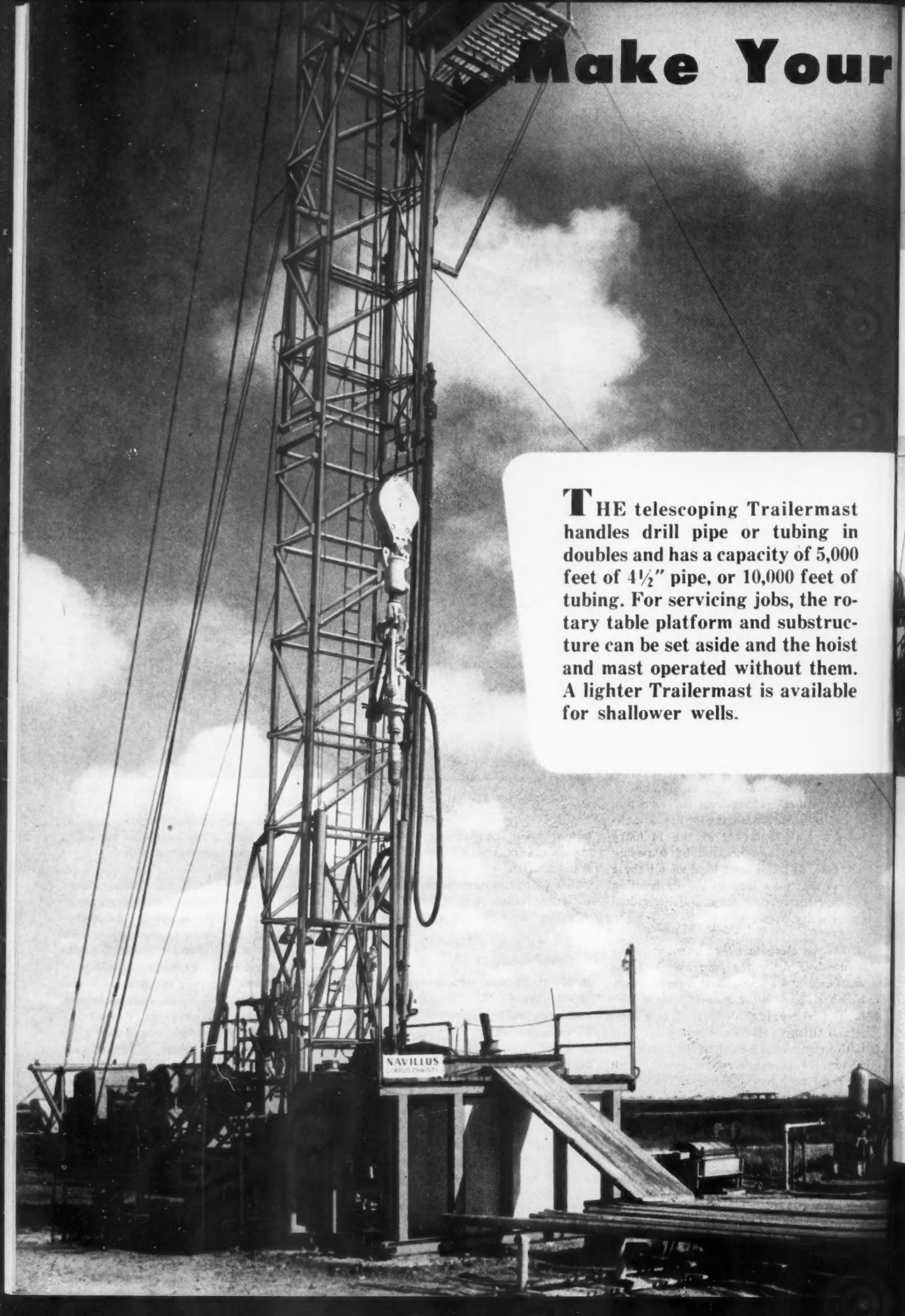
government control in one drastic step. The danger lies in the gradual encroachment of more and more controls until the final step toward complete control is scarcely noticed.

Q. *What do you have in mind?*
A. I refer to such warning signals as the various moves in Congress toward the writing of a so-called national oil policy. The pending bills for divorcement or disintegration of the oil industry are other measures in the direction of collectivism. Sometimes the attacks on different segments of the industry are unrelated and pressed by opposing interests. It's the sum total of all these efforts that may lead to the destruction of competitive enterprise and individual opportunity.

Q. *Do you think that the American people as a whole desire the government to run the business of the country through nationalization or other means?*
A. The American people, again and again, affirmatively have professed their faith in and attachment to the American system of competitive enterprise, with its right to private ownership and operation of business, its profit motive, and its opportunity for individual advancement. National election after national election has demonstrated that few Americans—less than 150,000 in recent years—will accept socialism under that name. Yet during the last two decades we have had the anomalous situation wherein the American people have acquiesced in the adoption of national policies more collectivist than the Socialist platforms they have scorned. The difficulty is that due to a lack of understanding they do not apply the principles in which they believe to specific situations.

Q. *What do you propose that American industry should do to clear up the misunderstanding to which you refer?*
A. Industry must tell how it functions in clear, simple language that all can understand. We must begin to talk about our competitive enterprise system in terms of what it means to consumers, rather than from the viewpoint of what it means to the owners or producers. We must present concrete, specific examples of HOW competitive enterprise serves the consumers of this country and HOW it has functioned to raise American living standards. The oil business offers dramatic illustrations of a dynamic, free market enterprise.

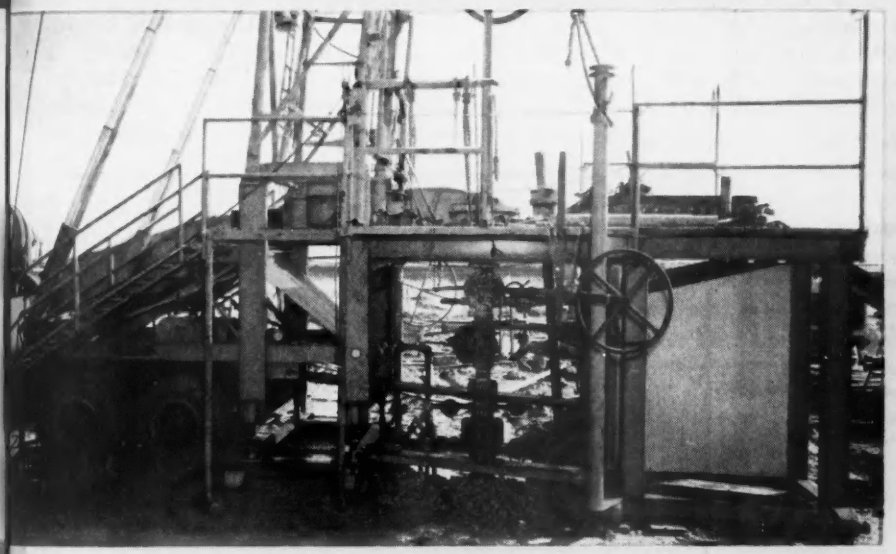
Q. *What are some of these illustrations?*
A. When we translate the operations of the petroleum industry into the everyday things of life, we must show how its varied products and reasonable prices have added to better living. Specifically, we must picture oil's progress in terms of more comfortable and warmer homes, healthier people, improved mobility of travel, and greater volumes of energy to operate power machines in factory and mine and on the farm. We must point out that while accomplishing these things, the industry has been improving the living standards of its own employees by providing numerous benefits, continuity of employment, and wages that are higher than any other substantial industry. People will be reluctant to tamper with a system they know works to their advantage.



THE telescoping Trailermast handles drill pipe or tubing in doubles and has a capacity of 5,000 feet of 4½" pipe, or 10,000 feet of tubing. For servicing jobs, the rotary table platform and substructure can be set aside and the hoist and mast operated without them. A lighter Trailermast is available for shallower wells.

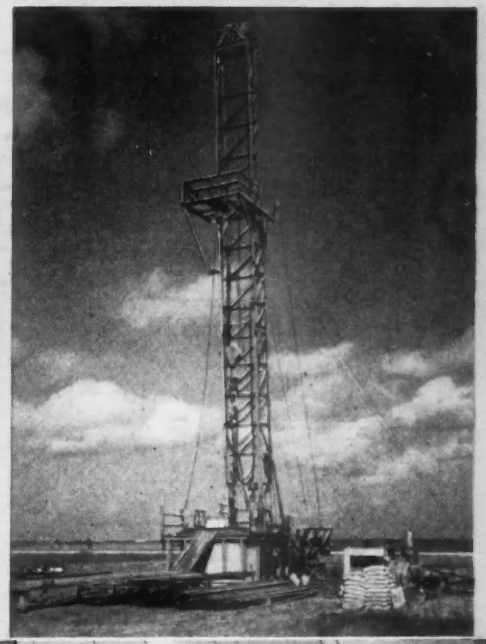
r Old Drilling Rig UP-TO-DATE with the *NEW* "CARDWELL" Trailermast

COMPETITION getting tougher? Put your draw works or hoist on this new Trailermast and cut your moving and rig-up expense in half. Your single-engine rig combined with this lightweight, telescoping mast on a trailer makes an up-to-date outfit that gives economy plus real satisfaction.



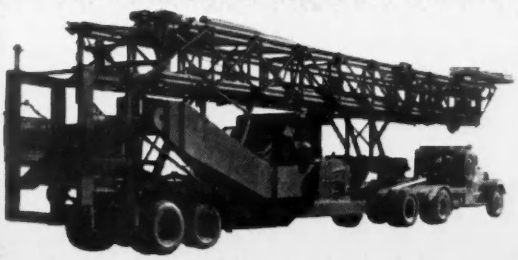
The 16' x 16' derrick floor provides plenty of working space and is high enough for blowout preventers and wellhead connections. Note optional location of doghouse.

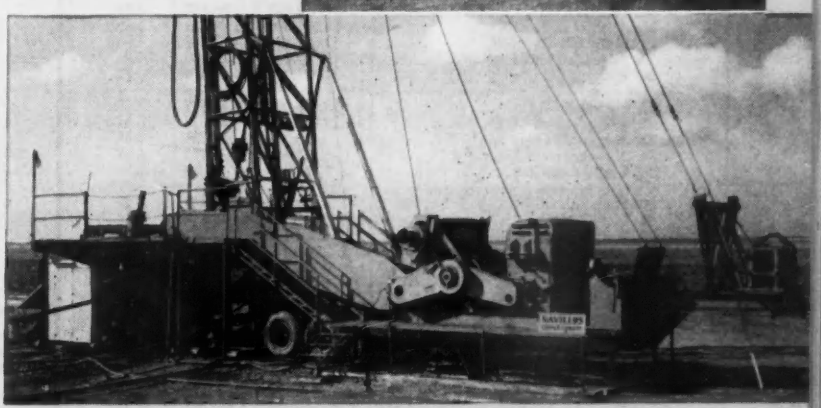
Mast is erected with built-in hydraulic system and raised to full height with traveling block and drilling line. The rig is usually ready for work in less than three hours.



Any "Cardwell" single engine rig is mounted on the Trailermast frame and can be removed for operation under conventional derrick. Note convenient walkways and built-in rathole digger.

Trailermast with draw works in place is quickly moved with a three- to five-ton truck tractor.





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Larger Companies Produce 62 Percent And Refine 86 Percent of U. S. Oil

By L. J. LOGAN
Associate Editor

THE highly competitive nature of the petroleum industry of the U. S. is reflected in the table herewith showing available figures on production and refining of individual companies in 1949.

Only 61.84 percent of U. S. crude production was accounted for in 1949 by 32 companies that reported their output in annual reports for the year. These companies included virtually all the larger concerns. The remaining 38.16 percent of U. S. production (nearly 2 million barrels daily) was contributed to the markets by thousands of smaller concerns and operators. (It has been estimated that there are about 18,000 independent operators engaged in drilling and production activities.)

There are naturally fewer refining companies than producing concerns, since crude feeds from far and wide into central manufacturing areas for processing in large volume in plants representing heavy investments. Nevertheless, only 86.02 percent of U. S. crude runs to stills in 1949 were accounted for by 25 companies, while 13.98 percent of runs to stills (745,394 barrels daily) occurred at many small plants throughout the country.

The largest producer of U. S. crude accounted for only 6.68 percent of the national total in 1949. That was Standard Oil Company (N. J.), with net production averaging 337,000 barrels daily. Of this amount, Humble Oil & Refining Company, domestic subsidiary of Jersey Standard contributed 275,900 barrels per day, equivalent to 5.47 percent of the U. S. total. Excluding Jersey Standard, Humble was the leading producer. Next were Standard Oil Company of California, The Texas Company, Gulf Oil Corporation and Shell Oil Company.

Jersey Standard also ranked first in refining, with crude runs to stills averaging 622,000 barrels daily, or 11.67 percent of the U. S. total. Other refiners among the top five were Socony-Vacuum Oil Company, The Texas Company, Standard Oil Company (Indiana) and Gulf.

Net Domestic Crude Oil Production and Refinery Runs of U. S. Companies in 1949

(Data from all available annual reports of U. S. companies)

COMPANY	Net Domestic Crude Oil Production (Company's Net Share: Does Not Include Royalty and Co-owner Interests) Total Barrels	Barrels Daily	Percent of U.S.	COMPANY	Crude Oil Runs to Stills Total Barrels	Barrels Daily	Percent of U.S.
(All Companies and Persons)	1,840,307,000	5,041,936	100.00)	(All Companies)	1,945,519,000	5,330,189	100.00)
1. Standard Oil Co. (New Jersey)	123,005,000	337,000	6.68	1. Standard Oil Co. (New Jersey)	227,030,000	622,000	11.67
*(Incl. above: Humble O&R Co.	100,703,500	275,900	5.47)	*(Incl. above: Humble O&R Co	76,577,000	209,800	3.94)
2. Standard Oil Co. of Calif.	91,596,750	250,950	4.98	2. Socony-Vacuum Oil Co., Inc.	166,075,000	455,000	8.54
3. The Texas Co	88,829,288	243,368	4.83	3. The Texas Co	151,037,739	413,802	7.76
4. Gulf Oil Corp	71,860,853	196,879	3.90	4. Standard Oil Co. (Indiana)	150,048,716	411,092	7.71
5. Shell Oil Co	70,095,000	192,041	3.81	5. Gulf Oil Corp	138,788,030	380,241	7.13
6. Standard Oil Co. (Indiana)	67,512,955	184,967	3.67	6. Shell Oil Co	119,356,000	327,003	6.13
7. Socony-Vacuum Oil Co., Inc	61,320,000	168,000	3.33	7. Standard Oil Co. of Calif.	109,682,746	300,501	5.64
8. Phillips Petroleum Co	35,314,186	96,751	1.92	8. Sinclair Oil Corp	95,108,811	260,572	4.89
9. Continental Oil Co	33,928,510	92,955	1.84	9. Cities Service Co	69,417,000	190,184	3.57
10. Sun Oil Co	30,659,000	83,997	1.67	10. Sun Oil Co	57,697,587	158,076	2.97
11. Sinclair Oil Corp	30,326,554	83,086	1.65	11. Tide Water Associated Oil Co	56,637,662	155,172	2.91
12. Tide Water Associated Oil Co	30,236,317	82,839	1.64	12. Atlantic Refining Co	52,718,045	144,433	2.71
13. Cities Service Co	29,365,000	80,452	1.59	13. Phillips Petroleum Co	49,801,001	136,441	2.56
14. The Ohio Oil Co	28,121,640	77,046	1.53	14. Union Oil Co. of Calif	42,829,000	117,340	2.20
15. Union Oil Co. of Calif	26,032,000	71,321	1.41	15. The Pure Oil Co	38,857,732	106,459	2.00
16. The Pure Oil Co	25,070,852	68,687	1.36	16. The Standard Oil Co. (Ohio)	32,165,758	88,125	1.65
17. Atlantic Refining Co	23,901,000	65,482	1.30	17. Richfield Oil Corp	30,237,000	82,841	1.55
18. Skelly Oil Co	19,507,891	53,446	1.06	18. Continental Oil Co	24,867,826	68,131	1.28
19. Amerada Petroleum Corp	19,089,396	52,300	1.04	19. Mid-Continent Pet. Corp	16,679,815	45,698	0.86
20. Richfield Oil Corp	12,983,000	35,570	0.71	20. Skelly Oil Co	11,654,793	31,931	0.60
21. Barnsdall Oil Co	12,036,622	32,977	0.65	21. The Ohio Oil Co	10,675,000	29,246	0.55
22. The Standard Oil Co. (Ohio)	11,136,930	30,512	0.61	22. Sunray Oil Corp	9,616,967	26,348	0.49
23. Sunray Oil Corp	10,729,020	29,395	0.58	23. Lion Oil Co	6,943,995	19,025	0.36
24. Mid-Continent Pet. Corp	6,727,846	18,432	0.37	24. Deep Rock Oil Corp	4,186,000	11,468	0.22
25. United Gas Corp	5,350,189	14,658	0.29	25. Panhandle Prod. & Refg. Co	1,338,104	3,666	0.07
26. Plymouth Oil Co	4,911,507	13,456	0.27	Total 25 Companies	1,673,450,327	4,584,795	86.02
27. Lion Oil Co	4,782,797	13,104	0.26	Rest of Industry	272,068,673	745,394	13.98
28. British American Oil Co., Ltd	4,495,715	12,317	0.24	Total United States	1,945,519,000	5,330,189	100.00
29. South Penn Oil Co	3,599,995	9,863	0.20				
30. Texas Gulf Producing Co	3,188,628	8,736	0.17				
31. Deep Rock Oil Corp	2,951,390	8,086	0.16				
32. Panhandle Prod. & Refg. Co	1,471,920	4,033	0.08				
Total 32 Companies	990,137,751	2,712,706	53.80				
†Royalty & Co-owner Oil Produced, Est	147,951,618	405,347	8.04				
†Gross Prod., above Companies, Est.	1,138,089,369	3,118,053	61.84				
Rest of Industry	702,217,631	1,923,883	38.16				
Total United States	1,840,307,000	5,041,936	100.00				

* Humble Oil & Refining Company's data are included with those of Standard Oil Company (New Jersey) and are not duplicated in totals.

† Net production of above companies (their net share) is here estimated as representing 87 percent of their gross production; and production for account of royalty and co-owner interests is estimated as 13 percent of gross.

A Uniform Plan for Applying

Gas Conservation Laws

Within a State

By PARK J. JONES
Consultant, Houston

IT IS BELIEVED that conservation laws can be applied so as to maximize the ultimate gas recovery, minimize the drilling of unnecessary wells on small tracts and certain edge leases, and at the same time enable landowners and operators to protect themselves against the loss of gas by migration. Cooperation is essential, and the plan here proposed offers an inducement for cooperation between the leases on a reservoir.

SPECIFIC meanings are ascribed to three different sets of words and phrases used in this paper. The in-place gas for a lease is the estimate of the initially in-place gas for the lease. The in-place gas for a reservoir is equal to the sum of the in-place gas for the leases on the reservoir.

A state may have ratable and non-ratable reservoirs which produce natural gas to market. The annual total Mcf's to market less the Mcf's per year from non-ratable reservoirs is the annual ratable Mcf's within a state for its ratable reservoirs.

Divide the annual ratable Mcf's by the in-place Mcf's for all the ratable reservoirs. The result is R, the ratable depletion rate expressed as a fraction per year of in-place gas for each one of the ratable reservoirs within a state. For instance, R could be four percent per year. The value of R may change from time to time. The ratable depletion for any time interval such as Δy years is $R\Delta y$ provided the average value of R for any one Δy years is used.

The ratable depletion rate for a lease is the same as for a reservoir, namely R. The ratable depletion for a lease is the same as for a reservoir, namely $R\Delta y$.

The ratable rate of take from a reservoir in Mcf's per year is equal to R times the in-place Mcf's for the reservoir. The ratable take in Mcf's during Δy years for a reservoir is its ratable rate of take multiplied by Δy.

Let the in-place gas for the ith lease on a reservoir be the fraction G_i of all the in-place gas for the reservoir. Then the ratable rate of take and the ratable take for a reservoir when multiplied by G_i give the corresponding values for the ith lease on the reservoir in Mcf's per year and Mcf's during any one Δy years, respectively.

Terminology: The Calculated Values

At the time of discovery, the space occupied by gas under a lease in a particular reservoir is given by

$$S = 7758ahf(1 - W) \qquad (1)$$

where

a = productive area, acres
h = average pay thickness, ft.
f = average porosity for ah, fraction
W = average interstitial water, fraction of porosity
S = space occupied by gas, bbls.

The barrels of space required to hold one MCF of gas (1000 standard cubic feet) is defined by

$$B = \frac{5.035TZ}{P} \qquad (2)$$

where

T = reservoir temperature,, °R
Z = compressibility factor
P = average reservoir pressure, psia.
B = volume factor for gas, bbls. space/MCF

The Mcf's of gas in place is given by

$$\frac{S}{B_o} = \frac{SP_o}{5.035TZ_o} \qquad (3)$$

where P_o and Z_o are the original pressure and compressibility factor.

Aside from water encroachment, the recoverable Mcf's of gas C upon declining the average pressure from P_o to P is given by

$$C = \frac{S}{B_o}\left[1 - \frac{PZ_o}{ZP_o}\right] \qquad (4)$$

Suppose pressure surveys are made at the beginning and end of some time interval such as Δy years which may be annual or any other time interval desired by the operators of the leases on a gas reservoir. Aside from water encroachment, the increase ΔC of the recoverable Mcf's by expansion alone during any one interim between pressure surveys is given by

$$\Delta C = \frac{SZ_o}{B_oP_o}\left(\frac{P_1}{Z_1} - \frac{P_2}{Z_2}\right) \qquad (5)$$

where P_1 is the average psia at the beginning of Δy years and P_2 is the psia at the end. The compressibility factors are calculated from the composition of a natural gas.

The calculated depletion, A, by expansion alone and expressed as a fraction of in-place gas is defined by

$$A = \frac{Z_o}{P_o}\left(\frac{P_1}{Z_1} - \frac{P_2}{Z_2}\right) \qquad (6)$$

It should be emphasized that the calculated depletion, A, of a lease aside from water encroachment is small during any Δy years for which the pressure decline $(P_1 - P_2)$ is small. The calcu-

lated depletion rate is $A/\Delta y$ aside from water encroachment.

Terminology: The Actual Values

The actual take from a lease is the Mcf's produced during any one Δy years. The actual annual rate of take is the actual take divided by Δy. The actual depletion is the actual take divided by in-place gas. The actual annual rate of depletion is the actual annual rate of take divided by the in-place gas.

In order to maximize the ultimate recovery, minimize the drilling of unnecessary gas wells on small tracts and certain edge leases and at the same time give landowners and operators an opportunity to protect themselves against the loss of gas by migration, it is necessary to apply gas conservation laws so as to enable and promote cooperation between the leases on a reservoir.

Through cooperation, two or more of the leases on a reservoir may be considered as one actual lease for the purpose of the actual depletion rate. Contiguousness is not required for cooperative purposes. All the leases on a reservoir may be aligned in one, two or several groups. Each group may be considered as one actual lease subject to the limitations of the ratable and calculated depletion rates.

The actual rate of depletion for the leases not having water encroachment should not exceed the calculated depletion rate. The latter is either equal to, or less than, the ratable annual depletion rate R. If periodic average pressures by leases can be ascertained, then an over or under estimate of the in-place gas can be corrected with the aid of equations (5) and (6) aside from water encroachment.

With water encroachment, the estimate of the in-place gas by leases may not be exact. The operators of the leases on a reservoir should try for a unanimous recommendation to the state for the in-place gas. Such a recommendation is subject to revision by the operators on the reservoir or by the state in the light of additional information. The actual rate of depletion for the leases having water encroachment is limited to the ratable rate of depletion. Some applications of the proposed plan will now be illustrated by examples.

Case A: One Group of Leases

Through cooperation, all the leases on a reservoir are grouped as one lease for the purpose of actual take. In this case the actual, calculated and ratable depletion rates would be equal aside from water encroachment and aside from an over or under estimate of in-place gas.

If the in-place gas were 1 billion Mcf's and R were 4 percent per year, the actual rate of take would be 40 million Mcf's per year or 109,489 Mcf's per day on the average. Of course, the daily peak demand during winter months could be significantly higher than the average daily take during a given year. The deliverability would have to equal the peak rate in order to average 4 percent per year.

Under the proposed plan, a state would require the composition of the gas and annual pressure surveys in order to check the estimate of the in-place gas. If the pressure surveys showed that the calculated rate of depletion $A/\Delta y$ was higher than the ratable rate of depletion R, either the state would reduce the actual depletion rate or the operators could reduce their recommendation as to in-place gas. Either way, the actual, ratable and calculated depletion rates would tend to become equal to each other.

On the other hand, if the calculated rate of depletion for several time intervals was less than the ratable rate of depletion, gas is migrating updip by virtue of water encroachment, the recommended in-place gas is too low or some combination of the two is the governing fact. The operators on the reservoir would have to show the approximate rate of depletion by water encroachment in order to increase the actual rate of take by recommending a higher in-place gas.

Ultimately, the reservoir would become non-ratable and the operators would then be required to submit an annual estimate of deliverability. The difference between the ratable rate of take and the deliverability would be included with the ratable Mcf's for the state.

The actual depletion at the time deliverability declined below the ratable rate of take would depend on the location and completion of wells, the rate of depletion, the rate of water encroachment and the operating wellhead pressure. A reservoir may require a compressor plant because wells alone cannot maintain deliverability aside from a fast enough rate of water encroachment.

Case B: Two Groups of Leases

Through cooperation, the structurally-low leases on a reservoir are grouped as one lease for the purpose of actual take. Similarly, the structurally-high leases are grouped as one lease. Suppose the operators agree that each group has 50 percent of the in-place gas. At the outset, the actual rate of take is the same for both groups as determined by the ratable rate of depletion.

Subsequent pressure surveys could show differences between the actual, calculated and ratable depletion rates. In the first place, neither the actual nor the calculated depletion rate for either group should exceed the ratable depletion rate. In the second place, the actual depletion rate for one group should not exceed its calculated depletion rate and the calculated depletion rate for both groups should be the same aside from water encroachment.

With water encroachment, the actual depletion rate for the structurally-low group is limited to the ratable rate of depletion. But when water invades some of the structurally-low wells, the actual rate of take for the low group is limited by its deliverability.

Now, in order to minimize migration of gas into the structurally-high leases, the actual depletion rate for the high group is limited to its calculated depletion rate. The latter is less than the ratable rate of depletion. If, for instance, half the rate of take from the low group is by water encroachment, the actual rate of take from the high group would be less than 50 percent of its ratable rate of take. The difference between ratable and actual takes is included with the ratable gas for the state.

For certain combinations of high and low lease groups, rate of water encroachment and deliverability for the low group, the calculated rate of depletion could tend to approach zero. If so, the state could give the structurally-high group a marginal rate of take in the absence of reasonable cooperation. But if the structurally-low group shows reasonable cooperation, the actual rate of depletion for the high group shall not exceed its calculated rate of depletion.

The proposed plan offers a material inducement for cooperation between the groups. The structurally-low group is not fully protected against the loss of gas by migration if the structurally-high leases do not cooperate. Therefore, the structurally-low group is very likely to cooperate.

Case C: Several Groups of Leases

Suppose the leases on a reservoir are aligned into several groups and the operators agree as to in-place gas for each group. At the outset, the actual rate of depletion for each group is the same as the ratable rate of depletion. But subsequent pressure surveys would be likely to show differences between the actual, calculated and ratable depletion rates. Aside from water encroachment into any one group, progressive adjustments in the actual rates of take would be so made that the calculated depletion rate for each group approached the ratable depletion rate.

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How to meet...

YOUR SPECIFIC GAS PROBLEMS

Tell us—

INTAKE PRESSURES AVAILABLE...

DISCHARGE PRESSURES REQUIRED...

STATION CAPACITY:

Cu. ft. per 24 hours

TYPE OF APPLICATION:

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Underground Storage....

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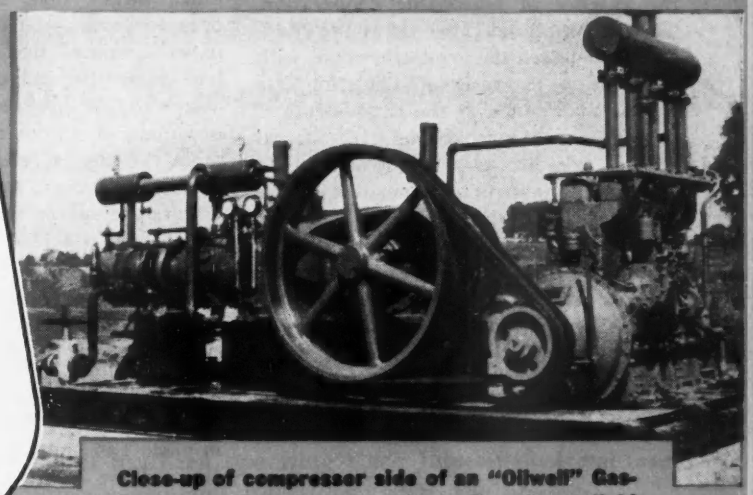
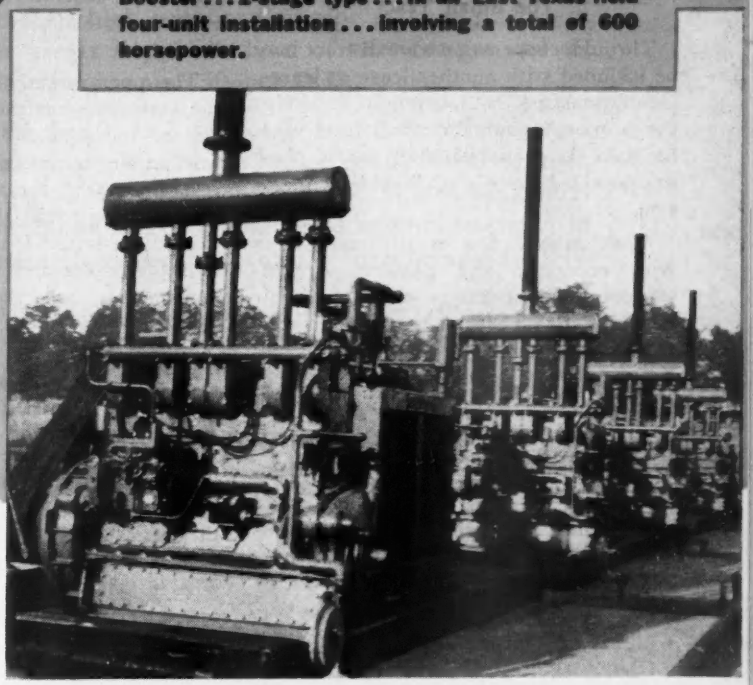


Close-up of compressor side of an "Oilwell" Gas-Booster...2-stage type...in an East Texas field four-unit installation...involving a total of 600 horsepower.



"Oilwell" Gas-Booster Units are of single or multi-stage design, complete with gas engines specially equipped for gas-booster service. They include heavy-duty V-belt drives, fan-type coolers for both engine and compressor and necessary pressure gauges—all ready to tie-in and start.

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ment into any group, suppose the deliverability for one group is less than its ratable rate of take. In order to minimize the loss of gas by migration, the actual rate of take from each of the other groups would have to be limited to the deliverability of the one group or, ultimately to a marginal rate of take in the absence of reasonable cooperation. This is a material inducement for cooperation between the groups because, with cooperation, the reservoir depletion rate can be maintained at the ratable rate.

With water encroachment, the actual rate of take for any one group would vary with the structural position of the various leases in the group. The inducement for cooperation between the groups would be greater because under the proposed plan the actual rate of depletion is limited to the calculated depletion rate for the leases not having water encroachment. With water encroachment the calculated depletion rate is less than it would be aside from water encroachment into some leases.

The Small Tract

Through cooperation a small tract may be included with another lease or leases. Contiguousness is not required. Under the proposed plan, the small tract ratable take is proportional to its in-place gas provided there is reasonable cooperation.

A definition of a small tract varies with economic and physical circumstances. The operators on a reservoir should define a small tract. The state permits the drilling of a well on a small tract and gives it a marginal rate of take (which nevertheless is more than proportional to in-place gas) if at a hearing by the state the small tract operator shows that cooperation is not reasonable. But when cooperation is reasonable, a well may not be drilled on a small tract.

Edge Leases

An edge lease is one on which a prudent operator would not drill a gas well. A gas reservoir may have several edge leases. Through cooperation, all edge leases may be considered as one lease for the purpose of ratable take. Furthermore, with water encroachment, the actual rate of take for edge leases is the ratable rate of take; whereas, the actual rate of take for the leases not having water encroachment is less than the ratable rate.

Under the proposed plan, the ratable rate of take for edge leases may be transferred to structurally-higher leases. This inducement may or may not be sufficient to promote reasonable cooperation on the part of the structurally-higher leases short of enforcement.

The Optimum Rate

A rate of depletion much in excess of the optimum causes waste by virtue of well, plant and field system capacity much larger than is required at the optimum rate. In the discussion above, it was assumed that the ratable rate is less than the optimum rate of take. When the ratable rate is higher than the optimum, operators may elect the optimum rate and a reservoir would not be ratable. However, such non-ratable reservoirs are subject to the rules that rate the leases on a reservoir.

Several Reservoirs in One Trap Zone

When the reservoir portion of a trap zone is faulted, a field may have several gas reservoirs. Each reservoir has its own actual rate of take according to its in-place gas and degree of cooperation. But a lease may be underlain by more than one reservoir. Furthermore, the optimum rate of take may be higher than the ratable rate.

The operators should recommend to the state whether they elect to produce one or more of the reservoirs for the field at the optimum rate or all of the reservoirs at the ratable rate with the understanding that the former does not exceed the latter. If it is also understood that the leases and reservoirs not having a current take are protected through cooperation.

Multiple-Reservoir Field

A field may have several gas reservoirs at various depths. Most of the productive area of the smaller reservoirs may be within the productive limits of the largest gas reservoir underlying the field. This is a multiple-reservoir field. The in-place gas by leases may be different for each reservoir. The need for cooperation with respect to locating and completing wells is outstanding. The needed cooperation is between the leases underlain by a reservoir and between the reservoirs underlying a field. Through cooperation, operators may elect either the optimum rate for some of the reservoirs or the ratable rate for all the reservoirs with the understanding that the former does not exceed the latter. There can be a material advantage to the state and the landowners and operators through such cooperation.

Developed Gas Fields

The proposed plan is intended for all newly discovered gas reservoirs and for as many of the gas reservoirs already developed as can be rated by the method. It is probable that the operators on many of the developed fields would work out a cooperative operation in line with the proposed plan because of its advantages. However, there would not be cooperation in the gas fields for which depletion is primarily by water encroachment. Of course, if more than 50 percent of the leases on a reservoir are losing gas by migration, the proposed plan probably could be enforced upon the leases into which gas is migrating.

The recommendation as to in-place gas made by the operators of a field should be open to question by the operators of the other ratable gas fields in a state. If a state line runs through a field, the suggestion is that the state having the higher depletion rate yield to the state having the lesser depletion rate.

The Compressor Plant

A compressor plant is required in order to maintain deliverability against pipe line pressure when the rate of water encroachment into a gas reservoir is not fast enough. The proposed plan enables operators, at the time a development program is formulated, to make a balance between the number of wells and the possible need of a plant at some future time.

A plant is not required if the rate of water encroachment is fast enough. On the other hand, a well invaded by water has no deliverability. The proposed plan enables operators to locate and complete wells during a development program so as to maintain future deliverability and thereby maximize the ultimate recovery of gas.

Gas from Oil and Condensate Fields

The gas necessarily produced with oil shall be marketable contemporaneously with that from natural gas reservoirs. However, the depletion rate to market from a primary gas cap in an oil reservoir and of the gas from a condensate reservoir shall not exceed the ratable depletion rate for the natural gas reservoirs within a state.

Conclusion and Acknowledgment

A uniform plan for applying natural gas conservation laws within a state has been outlined. The writer is not a lawyer, and the terminology here used may have to be changed to meet legal requirements. Originality is not claimed. On the other hand, the writer is not in a position to examine legal conservation literature and give credit where it is due. So in conclusion acknowledgment is made to all who have contributed to the methods of applying conservation laws.

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Work Simplification Procedure

By J. R. FREDENBERGER

Treasurer, Stanolind Pipe Line Company, Tulsa

WORK SIMPLIFICATION is essential to efficient office management. It eliminates poor systems and methods, saves time and money, and promotes greater efficiency. The author recommends a forms control program, under which forms are simplified and duplications and obsolete forms are eliminated.

WORK simplification is a scientific tool designed to eliminate poor systems and methods so as to save time and money and promote greater efficiency. Its principles have been recognized by industry and may be applied with equal success to small as well as to large businesses. Perhaps the most outstanding job accomplished through application of work simplification principles was that of the Hoover Commission in connection with the suggested reorganization of the executive branch of the U. S. government.

Work simplification as applied to office management may be defined as that policy, attitude or established methodical pattern of thinking of the office manager, office supervisors, and office workers which seeks to conduct all day-to-day activities and functions of the office in the least elaborate, least complicated, least intricate, and lease laborious manner consistent with the objective of the enterprise. It is more than just a one-time or one-target program. It represents the development of a "simplification attitude" on the part of supervisor and worker alike which will lead to economies of time, effort and materials that will be evidenced in the place where management always looks — the profit and loss statement.

As a prelude to work simplification a company-wide inventory should be made of forms and reports currently in use and a forms control program should be established.

Forms Inventory

A basic inventory of forms currently in use can be made by:

1. Preparing a list of all forms in use or on hand. (All types of records such as regular reports, memoranda, contracts, and so-called "form letters.")
2. Obtaining a copy of each form and assembling them in a systematic manner, either by the form number or by department or section as a "sample file." This file alone would provide a wealth of material for simplification in design, elimination of obsolete forms, and consolidation of readily apparent duplications.

Next prepare a more technical and detailed buildup of information on each form, such as:

1. The department or unit preparing the form.
2. A brief summary of the use of the form.
3. The number of copies prepared.
4. The distribution of copies.
5. That important cost factor—estimated time in man-hours required in preparation and processing.
6. Retention period in company current files and records storage.

Form Control Program

Knowing what forms are on hand and in use, set up a control program for a regular and systematic review. Responsibility for forms control should be assigned to one section or individual, who should have authority to determine the physical and functional specifications of the form, such as design, spacing, and selection of paper to be used. For him to carry out his duties properly:

1. Drafts of all proposed new or revised forms should be presented to him for review and recommendation.
2. A copy of each form to be reprinted should be submitted for a check of the current need for the information supplied by the form; possible eliminations, consolidation, or revision; and the most economical quantity to be reprinted, based on current usage.

With all forms passing through this centralized control, a record can be maintained of the cost of reproduction, and any savings effected in paper and printing costs through consolidation or elimination can be easily determined. If you have recorded in your forms inventory the estimated time in man-hours required to prepare and process a form, you are now in a position to show management (in that common denominator of dollars and cents) the approximate saving resulting from your efficient forms control program or work simplification projects.

So much for the over-all forms control, and now let's take a look at a formula for applying the principles of work simplification. There are many individual formulas for improving job methods and systems, but the writer believes that all of them contain these basic factors:

1. *Select the job to be studied.* It should be a job whose existence is justified and one which is probably troublesome. Why simplify something that should not exist in the first place?
2. *Break down the job* as it is done by the current method, listing all the facts in detail, to include material, use of machines, and hand work.
3. *Apply the questioning attitude.* Ask: What is done? What is its purpose? Why is it necessary in the first place? When is it done? Why is it done at that time? When should it be done? How is it done? Why is it done that way? How is the best way to do it? Where is it done? Why is it done there? Where should it be done? Who does it? Why does he do it? Who is the best qualified to do it?

Also apply this test to the materials, the office machines and equipment, and the office layout.

4. Develop the new methods, the best method, by *elimination* of all unnecessary details; *combination* with a related job; *revision* for better sequence of control; and *simplification* of all details necessary to the job.

5. *Obtain the agreement* of management that the new method is the best.
6. *Write up the procedure* for the new method.
7. When you have the approved procedure written as a guide, *install* the new method with the cooperation of the supervisors concerned.
8. Later, *follow up* to see how the new method is working. Regardless of the care and detail devoted to the development of a new method, occasional problems will develop. If these are not taken care of and the new method made to operate efficiently, the personnel concerned with its operation become dissatisfied and lose interest in making it operate.
9. Last, but of great importance to the success of future projects, *give credit* where credit is due for ideas and assistance in the development of the new method.

There are many ways to analyze a problem. The simplist method which will give the desired results will be the best. Among the basic tools of the "work simplifier" which are in general use are:

1. *Flow process charts,* which through the use of words and symbols give a step by step description of the series of operations necessary to perform a given task. These charts are valuable in that they compress a wide range of operations and activities within a relatively small space, and the graphic presentation calls attention to every detailed step.

These symbols which are in international use are:

(a) A *large circle,* indicating the performance of an operation.

(b) A *small circle,* indicating transportation, such as the carrying of forms or reports by office messenger.

(c) A *triangle,* indicating storage such as filing, or the placing of reports in an "in box" on a supervisor's desk.

(d) A *square,* indicating an inspection, such as the checking of an invoice by the Accounting department.

From the many varieties of Flow Process Charts, the following three basic types are herewith presented.

Chart No. 1. "Single-Column Process Chart." It is used to study the detailed steps of a relatively simple case, usually within only one section or department. These charts are usually printed forms, on which the flow of work is shown by connecting appropriate symbols and entering the name of the operation. The case shown on the chart might properly represent the action taken by a clerk responsible for entering in a register claims which have been settled.

Chart No. 2. "Multi-Column Process Chart." It is used to analyze the detailed flow of work of a more complex nature between several sections or departments. It shows more details and has a wider range than the single column chart. In preparing this type of chart, one could start with a printed form, ruled to provide columns and horizontal lines. Titles of the employes performing the various steps are entered and the proper symbols added opposite each title to describe the step. This chart is particularly useful in analyzing problems where a series of repetitive steps is involved; where a large volume of paper work is required; or where several employes, such as clerks, are assigned to do identical work.

There are many "extras" which may be added to the words and symbols of the basic chart. Notes may be entered beside each symbol to designate what operation is performed or whether the "storage" symbol represents an "in box" or a file, and how long the period of storage is. The number of copies prepared of forms or reports may be entered. One method of doing this is to use a fraction—the numerator representing the original and the denominator the number of copies of the original.

Chart No. 3. "Layout Flow Chart." This chart is a diagram of the office or offices through which the flow of work passes. The flow from desk to desk is indicated on the chart by arrows. By improving an office layout to fit improved methods, unnecessary steps and transportation can be avoided. Criss-crossing lines on the layout chart indicate that something can be worked out.

In preparing layout charts, the office space and equipment can be drawn to scale (usually ¼ inch equals 1 foot), using squared paper, or templates can be cut out and pinned or pasted on a floor plan. Layout templates are available from some stationery firms.

These three charts are examples of many types that can be used. The more extensive the work simplification program, the more detailed charts may be required, such as cost comparison charts, used to compare present and proposed methods to determine estimated savings in money; Left and Right Hand Charts, to analyze the hand motions made by an employe in performing a task; and Man and Machine Charts, used to study the action of an operator in relation to the use of a machine. These are but a few of many.

Use process charting as a tool of work simplification when making major changes in methods; when troublesome procedural problems demand investigation; when making a routine analysis or checkup to see if methods have been kept up with changing conditions; or when setting up a new system or method.

As a technique in reading the completed charts, *look first at the whole chart* to see if it is a sound process, or if unnecessary back-tracking and duplication of steps are apparent; next *look at groups of steps* in relation to the complete process to see if they serve necessary purposes; and finally, *look most critically at the individual steps,* one by one, with the questioning attitude —can it be eliminated, combined, rearranged, or simplified.

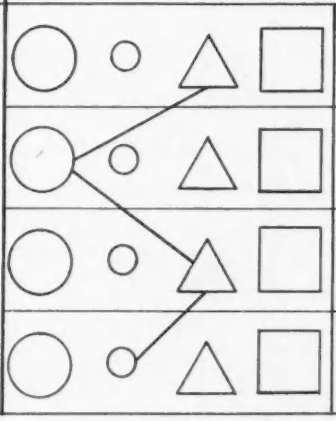
OBJECTIVE	CHART TO USE	ILLUSTRATION OF CHART		
To study the detailed steps in a relatively simple procedure such as one within a single organization unit.	SINGLE-COLUMN PROCESS CHARTS are often drawn on printed forms; work flow is shown by connecting the appropriate symbols.		1 2 3 4	Case on Desk Enter in register Out basket To file clerk

FIGURE 1. Single-Column Process.

Every organization, regardless of size, should have written procedures. The primary objectives of written procedures are the recording of methods in use for *control, simplification,* and *standardization.*

They provide a source of control to management in setting forth limits of authority and placing responsibility. Supervision is simplified and responsibility for errors fixed. They are of benefit in training new employes or empolyes promoted or transferred to new jobs. It is not intended that written procedures take the place of individual instruction; to the contrary, they should serve only as a guide and reference.

The larger the organization and the greater degree of specilization, the more serious is thet problem of interruption in the normal flow of work due to absenteeism and abrupt personnel changes. The sudden death of a key employe in an automobile accident, for example, creates an immediate need for a replacement.

Written instructions are of value to the employe in that they dispel doubts as to whether or not a policy or method is being correctly applied. He is reassured in making decisions in accordance with written policy or procedures, that the policy or procedure is the approved statement of management. It is protection for him when someone asks "Why did you do it that way?," and he is able to show the appropriate reference in the procedure.

There are many types and styles of procedures, standard practice bulletins, or instruction letters in use. The system can be as elaborate as the time and money management will authorize. However, regardless of the extent to which one goes into the preparation of written procedures, there are certain fundamentals which should be observed in all cases:

1. Responsibility for the issuance of the procedures should be clearly established and all written procedures cleared through the responsible party.
2. Procedures should be issued in a standard format suitable for binding in manual form.
3. They must be readable, understandable, and usable.
4. A simple but complete indexing system should be used to facilitate reference to specific instructions.
5. Procedures must be kept current by continuous, prompt revision. Nothing tears down confidence in procedures as much as the accumulation of obsolete instructions which cannot be relied upon as the authorized word of management.
6. A process of continuous or at least periodic checking to determine that the procedures in effect are being followed. The success of the work simplification program depends upon the following of instructions by the workers, to give effect to the revised methods. If the procedure is not being followed, there must be some good reason.

Work simplification pays off and is here to stay. It has many applications —simplified letters—simplified methods —simplified files—simplified living. Ten years ago it may have been called "efficiency"—today "Work Simplification." Regardless of what it is called, the questioning attitude or method of thinking remains the basic factor.

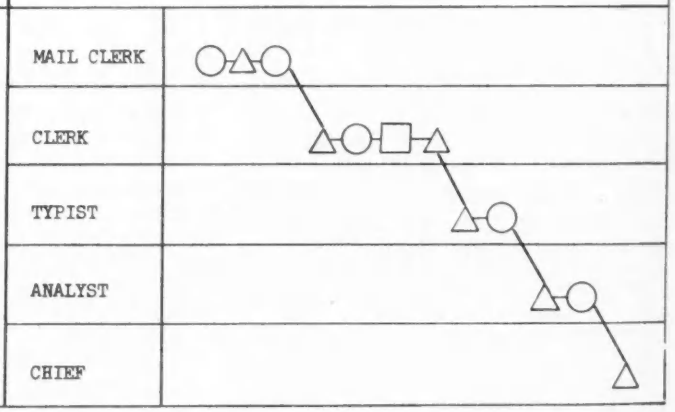
OBJECTIVE	CHART TO USE	ILLUSTRATION OF CHART
To analyze the detailed steps in a flow of work that is quite complex or involves several organization units.	MULTI-COLUMN PROCESS CHARTS show steps in greater detail than on a work flow chart - - symbols are used to describe steps.	

FIGURE 2. Multi-Column Process.

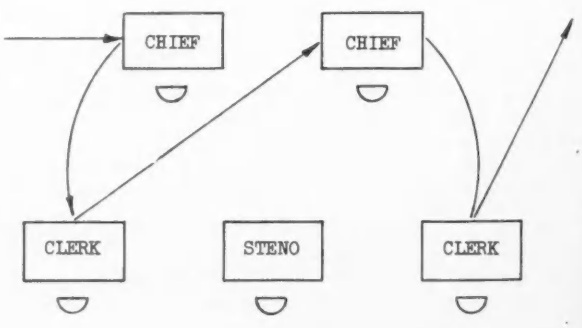
OBJECTIVE	CHART TO USE	ILLUSTRATION OF CHART
To improve the layout of the office so that unnecessary steps can be avoided.	LAYOUT FLOW CHARTS involve a diagram of the office made to scale - - the flow from desk to desk is shown by arrows.	

FIGURE 3. Layout Flow Charts.

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5. 9"x4 1/4"x9" — 80 H.P., 10-Lb. Suction, 500-Lb. Discharge, 405,000 Cu. Ft. Per Day.
6. 4 1/8"x9" — 45 H.P., 200-Lb. Suction, 600-Lb. Discharge, 630,000 Cu. Ft. Per Day.
7. 3 1/2"x11" — 85 H.P., 800-Lb. Suction, 1750-Lb. Discharge, 1,792,000 Cu. Ft. Per Day.
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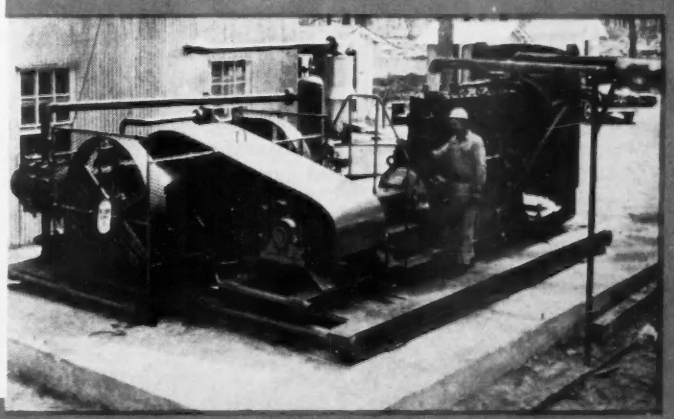
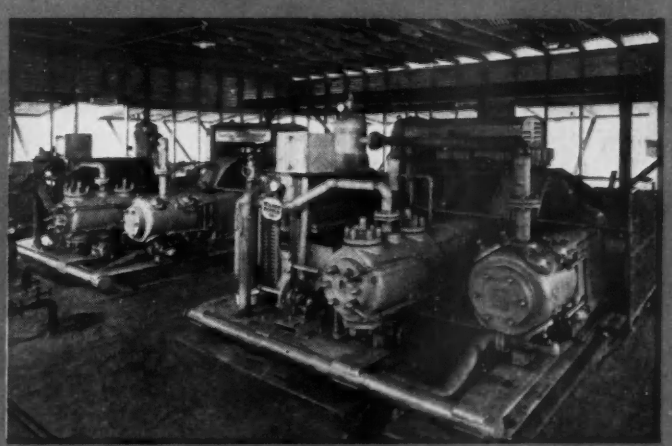


EUREKA FIELD, TEXAS



REFUGIO, TEXAS

AGUA DULCE, TEXAS

56 Years of

Gulf Coast Oil

By J. E. KASTROP
Gulf Coast District Editor

SPREADING about 600 miles along the Gulf of Mexico from Matagorda County, Texas, to the Louisiana-Mississippi state line, and extending inland 130 to 150 miles is that prolific oil and gas province known as the Gulf Coast. Discovery of famous Spindletop in 1901 near Beaumont, Texas, touched off an extensive exploration campaign that has endured half a century, and the tempo has never ceased. Oil activity continues at an accelerating pace, and indications are that this oil-rich region will be a bright spot in U. S. oildom for many years to come.

The importance of petroleum in the Gulf Coast is brought into focus by comparison with the entire nation. In reserves, this coastal territory is exceptionally high, in both oil and gas. Although gas reserves figures can always be debated, some sources estimate that this region had about 60 trillion cubic feet of gas reserves at the end of 1949, or approximately one-third of the known gas reserves in the country. Exploration trends to deeper and deeper zones make the gas reserves outlook extremely favorable.

Perhaps the biggest money crop in the Gulf Coast is oil. A conservative estimate reveals that in this region the total liquid hydrocarbon reserves, which include crude oil and condensate, is approximately 5 billion barrels, or about 17½ percent of the total liquid hydrocarbon reserves of this nation, which on January 1, 1950, were estimated at 28,378 billion barrels.

During 1949, the Texas and Louisiana Gulf Coast produced almost 16 percent of the U. S. crude output. Combined production of the coastal areas of these two states last year accounted for 291,423,000 barrels or an average of 798,400 barrels of oil per day. Since the first records were kept on production, the Gulf Coast has contributed about 11 percent of all the oil produced in the U. S. The cumulative total oil produced amounts to almost 4 billion barrels. There are eight fields that have each produced more than 100 million barrels. They are Conroe, Hastings, Hull, Humble, West Columbia, Webster, all in Texas and Jennings, in Louisiana.

The tremendous demand for petroleum immediately following the war brought on a widespread exploration campaign throughout the industry. Much of this

In the marsh country of South Louisiana, a new well is drilled from an anchored barge. Nearby are separators, tank battery and storage tank.

campaign was concentrated on the Gulf Coast. Many new fields were found, and oil was produced as rapidly as it could be moved to storage and to refineries. As a result, 1948 production in the nation and the Gulf Coast reached an all-time high. During that year, more than 321 million barrels were produced in the Gulf Coast, or almost 1 million barrels each day.

This petroleum province is equally prolific of gas. Development of vast markets for gas in the industrialized East and Midwest brought on a pipe line construction boom. Super-sized lines were laid and existing lines were looped and re-looped to take advantage of this availability of natural gas at a relatively cheap rate. Total gas production for this area in 1949 was about 1226 billion cubic feet, or a little more than 21 percent of the country's total gas output, which amounted to 5766 billion cubic feet.

Exploratory Results

Exploratory results in the Gulf Coast have been much better than for the country as a whole. For strictly wildcatting, last year's records indicate that one out of every 5.4 wildcat tests drilled in the coastal region discovered production. The national average was one discovery for every 7.7 wildcat wells drilled. Last year 411 strict wildcats were drilled, resulting in the discovery of 76 new Gulf Coast fields. Of this number, 38 were oil fields, ten were gas fields and 28 were distillate. For the nation, about 6680 wildcats were drilled to discover 866 new fields.

In the exploration for new fields, new pays and field extensions, the Gulf Coast chalked up remarkable scores. During the past year, 94 new pay zones were discovered, and 19 field extensions were made. Including new fields discovered, this number totals 189 new fields, new pays and extensions for the year, or about 12.3 percent of the nation's exploratory successes, were made in the Gulf Coast.

The drilling industry continued to boom in 1949. During last year, 2294 wells were drilled in the Gulf Coast, including exploratory and field wells. This number represents a total of 15,776,289 feet of hole, which is second only to the state of Texas in total footage drilled in the U. S. Oklahoma, with 15,567,514 feet drilled last year, was slightly behind the Gulf Coast. Predictions for this year point toward more footage than last, with an expected total of 17.5 million feet. This is not an unusual prediction, when it is realized that wells are going deeper. Last year, 45 percent of all wells drilled below 10,000 feet in the U. S. (total of 465 wells) were drilled in the Gulf Coast. Of the 26 wells drilled below 14,000 feet in the nation, 18 of them were in the coastal plains of Texas and Louisiana.

The deepest test in this region was drilled in 1945 by Phillips Petroleum Company. It was Schoepps 3, in the Millican Salt Dome of Brazos County, Texas, and was drilled to a total depth of 16,655 feet, a world's record for that year. Last year saw an increase in the number of rigs as compared to the previous year. At the end of 1949 there were 286 rigs active in the Gulf Coast, while at the end of the previous year there were only 279.

The third deepest producing well in the world was completed last year in the Gulf Coast. It was Humble Oil & Refining Company's State lease 1452-1, Lake Raccourci, Lafourche Parish, Louisiana. This well produces condensate from 14,467 feet. There are 15,051 producing wells in the Texas and Louisiana Gulf Coast. Of this number, 13,336 are oil wells, and 1715 are gas and distillate wells. Considered by many to be the most outstanding discovery in the Texas Gulf Coast during the year was Houston Oil Company's new Village Mills field in Hardin County. Production has been encountered in four different formations; the Wilcox, Yegua, Cockfield and in the Eocene sands.

Continental Shelf Activity

Postwar demand for oil prompted exploration onto the continental shelf of the Gulf of Mexico. The first oil to be discovered on the shelf beyond the three-mile line was by Kerr-McGee Oil Industries, Inc., State lease 1, Block 32, Ship Shoal area off Terrebonne Parish, Louisiana. The well was 11 miles off shore in 17 feet of water. Since the beginning of offshore activity in 1945, about 40 U. S. oil companies have taken to the sea, and combined have spent well over $100 million seeking oil beneath the Gulf's waters. Up to January of this year, value of oil produced amounted to only about $340,000. There have been 53 offshore wells drilled through the early part of 1949. Eight of these wells were gas-condensate producers, 12 were oil wells, and 1 was a dry gas well, with 33 dry holes. The great potentialities on the continental shelf provide the initiative which keeps the offshore exploration program going. First production off the Texas Coast was discovered in 1949 by Stanolind Oil and Gas Company. It was the company's Number 1 State Block 245, off Galveston County, drilled to 11,017 feet and completed in the Miocene at 5934-5968 feet. Other offshore tries along the Texas Coast were unsuccessful.

It is significant that the known recoverable reserves of the Gulf Coast are considerably more than the total volume of oil produced in this area during the past half century.

Highlights of Gulf Coast Oil Development

1893—First oil produced on the Gulf Coast at Sour Lake.

1901—Spindletop discovered, first major oil field on the Texas Gulf Coast. Jennings field, first oil field in South Louisiana, discovered.

1906—Goose Creek discovered, first production from deep-seated dome.

1920—First micro-paleontology laboratory for oil industry established on Gulf Coast.

1924—First dome outlined by torsion balance.

1928—Sugarland discovery started new refraction seismograph campaign.

1930—Reflection seismograph introduced. Repressuring began at Sugarland.

1931—Conroe field, biggest in Gulf Coast, discovered, started boom along the Conroe trend.

1932—First marine barge rig. The Texas Company's "McBride," rigged up on the State Garden Isle Bay # 5 Sept. 11.

1933—Electrical logging and directional drilling introduced on Gulf Coast.

1934—Gun perforating introduced.

1937—First coastal oil from below 10,000 feet produced at Old Ocean on Texas Coast, and at Lirette in South Louisiana.

1938—Creole field, Louisiana, first field in Gulf of Mexico discovered one mile offshore by Pure and Superior.

1945—World's deepest well, Phillips' Schoepps # 3, Millican Dome, Brazos County, Texas. Total depth: 16,655 feet.

1946—World's deepest producing well completed by Shell at Weeks Island, Louisiana, at 13,763 feet. Beginning of large-scale offshore operations.

1947—First well completed beyond the three-mile limit on the Gulf's Continental Shelf by Kerr-McGee Oil Industries, Inc., in Block 32, Ship Shoal area off Terrebonne Parish, Louisiana.

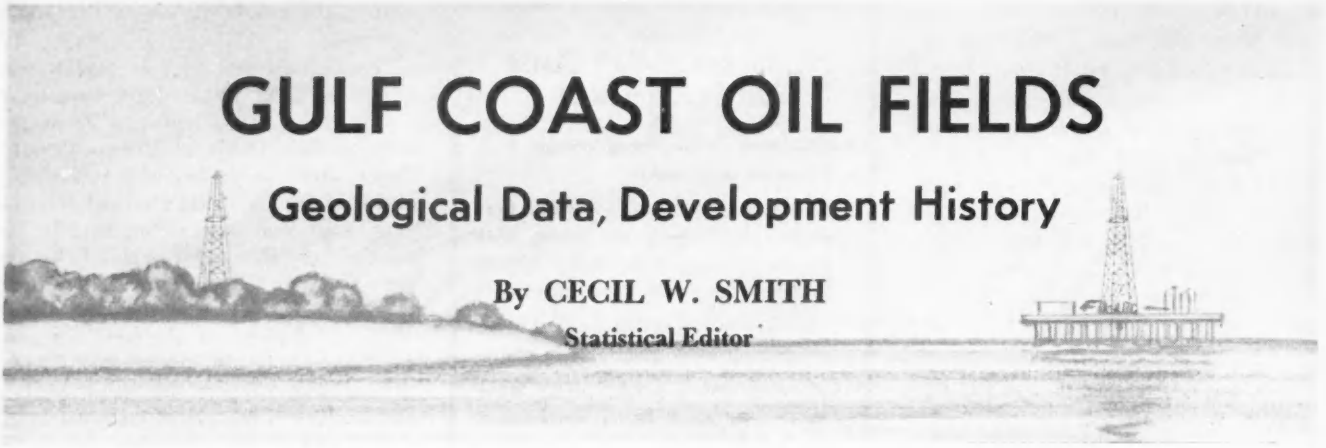
1948—Gulf Coast production reaches all-time high of almost one million barrels daily.

1949—Humble completes third-deepest producer in world at Lake Raccourci, Lafourche Parish, Louisiana. Condensate at 14,467 feet.

GULF COAST OIL FIELDS

Geological Data, Development History

By CECIL W. SMITH
Statistical Editor



TEXAS

AUSTIN COUNTY

NEW ULM

Near New Ulm in Jas. Tylee & Adam Kuykendall Surveys. **Discovery Data:** Structure by surface geology and reflection seismograph. Field by Sinclair's Schweke A-1 completed Sept. 9, 1945. **Structure:** Faulting associated with folding. **Producing Formations:** Wilcox 9048-58, 9151-65, 9467-85, 9612-18 ft. **Production in 1949:** 2860 bbls.; through 1949: 35,560 bbls; daily, March 1, 1950: 470 bbls. **Producing Wells, March 1, 1950:** 3 with 1 rig running. **Gravity:** 34.6-41.1°. **Deepest Test:** McCarthy O&G Co's. Leo Schiller et al 1-A, 10,206 ft in Wilcox. **Oil Outlet:** Truck. **Principal Leaseholders:** Sinclair, Gulf, & McCarthy.

ORANGE HILL (Distillate)

1½ mi se Orange Hill. Vital Flores, H. E. Frisins, Rosa Archer, H&TC Surveys. **Discovery Data:** Structure by reflection seismograph in 1938. Field by Ohio Oil Co.'s Roy B. Kaechele 1, completed Nov. 8, 1942. **Structure:** Fault. **Producing Formation:** Wilcox 9050-9145 ft. **Production in 1949:** 66,007 bbls; through 1949: 110,167 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs runnings. **Gravity:** 44.3°. **Deepest Test:** Discovery well at 10,104 ft in Wilcox. **Oil Outlet:** Truck. **Principal Leaseholders:** Ohio, Stanolind, Humble, Sun. **Remarks:** Gas is piped to TGT line by Ohio's 6-in.

RACCOON BEND

8 mi e Bellville, 7 mi sw Hempstead. **Discovery Data:** Structure by surface geology, gas seeps, sulphur water, paraffin dirt, broken surface. Field by Humble's Gotosky 2 completed Jan. 15, 1928. **Structure:** Deep seated dome with pronounced horst and graben faulting. **Producing Formations:** Whitsett 3100-3250, McElroy 3420-3570, Cockfield 3800-4300, 5544-68 ft. **Production in 1949:** 1,783,534 bbls; through 1949: 45,069,855 bbls; daily, March 1, 1950: 4,389 bbls. **Producing Wells, March 1, 1950:** 158 with no rigs running. **Gravity:** 14-37.1°. **Deepest Test:** Humble's Luther Sherrod 16-Y, 11,447 ft in salt. **Oil Outlets:** Humble Pipe Line 8-in. **Principal Leaseholder:** Humble. **Remarks:** Gas is piped to Brenham, Hempstead, Prairie View, and Navasota by Southern Union Utilities.

SAN FELIPE

1 mi sw McDowell, in S. F. Austin Lge. **Discovery Data:** Field by Magnolia Petroleum Corp.'s Joe Vitek 1, completed Dec. 31, 1949. **Structure:** Piercement salt dome. **Producing Formation:** Cook Mountain 8069-81 ft. **Production in 1949:** 522 bbls; through 1949: 25,430 bbls; daily, March 1, 1950: 32 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Deepest Test:** Discovery well at 8202 ft in Eocene. **Principal Leaseholder:** Magnolia. **Remarks:** This field, sometimes called Brookshire, was opened by Seaport Oil Co. in 1934. Only one producer was completed and that was abandoned in 1941 after producing 24,908 barrels of oil.

SEALY (Distillate—Shut in)

3 mi wsw of Sealy. Geo. T. Allen sur. **Discovery Data:** Structure by reflection seismograph in 1938. Field by Shell's Hintze 1, completed June 24, 1942. **Structure:** Fault closure. **Producing Formation:** Wilcox 8721-71 ft. **Production:** Shut in since discovery. **Deepest Test:** Discovery well at 11,503 in Wilcox. **Principal Leaseholders:** Shell, Tide Water, Sun. Ohio.

BRAZORIA COUNTY

ALGOA (Distillate)

2 mi nw Algoa Twst I&GN Survey. **Discovery Data:** Field by Rowan Drlg. Co. & Texas Gulf Prod. Co.'s J. H. Blackwell 1, completed May, 1949. **Producing Formation:** Frio 10,554-61 ft. **Production in 1949:** 538 bbls; through 1949: 538 bbls; daily, March 1, 1950: Shut in. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Deepest Test:** Discovery well at 10,865 ft in L. Frio. **Principal Leaseholders:** Rowan Drlg. & Texas Gulf Prod.

ALLEN (Abandoned)

8 mi n of coast on Bernard River. **Discovery Data:** Structure by torsion balance in 1925. Field by Shell's Bernard River 1 completed May 17, 1927. **Structure:** Mushroom or overhanging type salt dome, cap rock 822 ft, salt 1380 ft. **Producing Formation:** Miocene 4346-5384 ft average sand thinckness of 80 ft. **Production through 1940:** 92,832 bbls. **Deepest Test:** Gulf's S. M. Allen et al 2 at 12,667 ft in Vicksburg. **Principal Leaseholders:** Mills Bennett & Shell. **Remarks:** Abandoned in 1940.

ANGLETON (Anchor)

1 mi sw Anchor. J. C. Valderas, J. W. Cloud, S. Marsh, & G. Robinson Surveys. **Discovery Data:** Structure by reflection seismograph, several companies, 1933-39. Pure and Stanolind prominent in exploration. Field by Glenn McCarthy's Carr 1 completed Oct. 9, 1939. **Structure:** Deep seated dome. **Producing Formation:** Frio 9750-10,574 ft. **Production in 1949:** 136,775 bbls; through 1949: 1,493,137 bbls; daily, March 1, 1950: 355 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Deepest Test:** Stanolind's A. L. Holland 1, at 12,581 ft in Frio. **Oil Outlet:** Humble Pipe Line. **Principal Leaseholders:** McCarthy, Humble, Texas Co., Magnolia, Sun. **Remarks:** Was originally called Anchor.

BAILEYS PRAIRIE (Distillate)

6 mi sw Angleton. C. Smith, S. Carter, J. B. Bailey & HT&B Surveys. **Discovery Data:** Structure by Atlantic, Gulf and Humble's reflection seismograph surveys in 1937-38. Field by Glenn McCarthy's W. B. Munson 1, completed in Oct., 1940. **Structure:** Deep seated dome, faulted. **Producing Formations:** Frio 10,535-555 (Adb '43), 10,-854-880 ft. **Production in 1949:** None reported; through 1949: 4262 bbls. **Gravity:** 43.3°. **Deepest Test:** Pan American's M. S. Munson 1, at 11,956 ft. in Frio. **Principal Leaseholders:** McCarthy & Pan American. **Remarks:** Reopened by Pan American in 1948.

BLUE LAKE

5½ mi nw Angleton. Wm. Roberts, J. Bradley, G. Robinson Surveys. **Discovery Data:** Structure by subsurfaced geology and reflection seismograph. Field by Glenn McCarthy's Wilson 1 completed Feb. 9, 7945. **Structure:** Fault on large anticline. **Producing Formations:** Frio 8516-22, 8702-14, 8915-23, 8930-38, 8996-9008, 9028-40, 9128-40, 10,980-11055 ft. **Production in 1949:** 364,815 bbls; through 1949: 1,940,856 bbls; daily, March 1, 1950: 653 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 31-55°. **Deepest Test:** McCarthy O&G Corp.'s Mrs. E. M. Corbett 1, at 11,738 in Frio. **Oil Outlet:** The Texas Co. Pipe Line. **Principal Leaseholder:** McCarthy.

BRYAN MOUND

3½ mi sw Freeport, in Henry Burt Survey. **Discovery Data:** Structure by surface indications of elevation, gas seepage and sulphur water; also worked by Texas Co. reflection seismograph in 1935. Field by Freeport Sulphur Co.'s Fee 2-A, completed August 13, 1949. **Structure:** Piercement type salt dome. **Producing Formation:** Miocene 1360-88 ft. **Production in 1949:** 6142 bbls; through 1949: 6142 bbls; daily, March 1, 1950: 19 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Deepest Test:** Freeport Sulphur's Fee 8-A at 4608 ft. **Principal Leaseholder:** Freeport Sulphur Co. **Remarks:** A well, drilled by The Texas Co. in 1935, swabbed 5 bbls of oil before being abandoned. Freeport Sulphur Co. has mined sulphur on this structure since 1914.

CHENANGO

Centering Chenango townsite. Wm. Parker & S. Marsh Surveys. **Discovery Data:** Structure by reflection seismograph. (Atlatl Royalty Co., 1935). Field by J. Newton Rayzor's Christian 1 completed Jan. 27, 1941. **Structure:** Probable deep seated dome. **Producing Formations:** Frio 8566-73, 8954-65, 10,010-020 ft. **Production in 1949:** 77,238 bbls; through 1949: 253,475 bbls; daily, March 1, 1950: 156 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 31.7-37.7°. **Deepest Test:** Stanolind's Louisa B. Brundrett 1, at 10,500 ft in Frio. **Oil Outlet:** The Texas Co. Pipe Line. **Principal Leaseholder:** Pan American. **Remarks:** Discovery was made on farmout from Sun. Distillate area extending sw, sometimes called Chenango, South, was opened in 1942 by Stanolind.

CHOCOLATE BAYOU

SW of Alvin in Perry-Austin & HT&B surveys. **Discovery Data:** Structure by surface geology and torsion balance in 1927. Reflection seismograph by McCarthy. Field by McCarthy & Plummer's Houston Farms 1, completed Aug. 22, 1939. **Structure:** Deep seated dome. **Producing Formations:** Frio 8663-11,480 ft (13 pays). **Production in 1949:** 3,520,424 bbls; through 1949: 10,313,760 bbls. **Producing Wells,** March 1, 1950: 81 with 2 rigs runnings. **Gravity:** 30.9-56° **Deepest Test:** Phillips' N. H. Robnett et al 1 at 12,600 ft in Frio. **Oil Outlet:**

Pan American pipe line. **Principal Leaseholders:** Phillips, McCarthy, Stanolind, Texas. **Remarks:** Discovery was a distillate producer. First commercial oil well was drilled by Phillips in 1940.

COLLINS LAKE

4 mi sw Angleton in C. Smith Lge. **Discovery Data:** Structure by reflection seismograph. Field by McCarthy O & G Corp.'s M. B. Nickell 1, completed Dec. 15, 1946. **Producing Formations:** Frio: 9100-10, 9182-90, 9830-40, 10,488-504, 10,594-606 ft. **Production in 1949:** 49,193 bbls; through 1949: 63,328; daily, March 1, 1950: 254 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 33.1-52°. **Deepest Test:** McCarthy's R. F. Willy 1, at 12,200 ft in Frio. **Oil Outlet:** McCarthy pipe line. **Principal Leaseholder:** McCarthy. **Remarks:** Field originally called Scoby Lake and produced only distillate until McCarthy's Willy 1 discovered oil in 1949.

DAMON MOUND

Encircling town of Damon. **Discovery Data:** Structure by topographic high of 80 ft, gas seeps, and mineral water. Field by Texas Exploration Co.'s Wisdom 1 completed Nov. 15, 1915. **Structure:** Piercement type salt dome, cap rock at surface, salt 529 ft. **Producing Formations:** Frio 1384-1427, 2700-43 ft. **Production in 1949:** 38,001 bbls; through 1949: 10,604,609 bbls; daily, March 1, 1950: 208 bbls. **Producing Wells, March 1, 1950:** 16 with 3 rigs running. **Gravity:** 21-33°. **Deepest Test:** Sinclair Prairie's Bryan 31-A at 8112 ft in Vicksburg. **Oil Outlets:** Sinclair 8-in, Humble 4-in. **Principal Leaseholders:** Sinclair, I. S. Wisdom. **Remarks:** General Crude re-opened oil production on the north flank in 1948.

DANBURY DOME

1 mi ne of Danbury. **Discovery Data:** Structure by surface indications and Shell's refraction seismograph in 1929. Field by Shell's Blakely-Winston 1 completed Feb. 28, 1930. **Structure:** Salt dome. **Producing Formations:** Miocene 1963-2886 ft, Frio 3378-8976 ft. **Production in 1949:** 480,525 bbls; through 1949: 4,028,257 bbls; daily, March 1, 1950: 1182 bbls. **Producing Wells, March 1, 1950:** 38 with no rigs running. **Gravity:** 23-50°. **Deepest Test:** Humble's So. Texas Rice Co. 3, at 11,500 ft in salt. **Oil Outlet:** Humble pipe line. **Principal Leaseholders:** Humble & Rowan. **Remarks:** First commercial production was Rowan Drilling Co. and Shell's Jamison 1, completed Sept. 12, 1937.

FLAG POND

2 mi n Old Ocean field, B. C. Franklin Survey. **Discovery Data:** Field by Hassie Hunt, Tr's H. H. Stowe 1, completed Jan. 15, 1949. **Producing Formation:** Frio 10,690-97 ft. **Production in 1949:** 1218 bbls; through 1949: 1218 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 53.9°. **Deepest Test:** Discovery well at 11,030 ft in Frio. **Principal Leaseholder:** Hassie Hunt, Tr.

HALLS BAYOU (Distillate)

10 mi se of Alvin. Perry &Austin Survey. **Discovery Data:** Structure by reflection seismograph. Field by Humble's Houston Farms & Development Co. B-1 completed Feb. 7, 1943. **Structure:** Deep seated dome. **Producing Formation:** Frio 10,258-280 ft. **Production in 1949:** 20,538 bbls; through 1949: 457, 623 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 42.5°. **Deepest Test:** Discovery well at 13,253 ft in Frio. **Oil Outlet:** Humble 5-in. **Principal Leaseholder:** Humble.

HASTINGS

5 mi n Alvin. **Discovery Data:** Structure by torsion balance in 1934 and checked by reflection seismograph in same year. Field by Stanolind's Surface 1 completed Dec. 23, 1934. **Structure:** Non-piercement deep dome with faulting. **Producing Formation:** Frio 5400-6000 ft. **Production in 1949:** 14,311,247 bbls; through 1949: 182,303,576 bbls; daily, March 1, 1950: 32,045 bbls. **Producing Wells, March 1, 1950:** 660 with no rigs running. **Gravity:** 31°. **Deepest Test:** Stanolind's Sneed 4, 8792 ft in Vicksburg. **Oil Outlets:** Humble & Pan American pipe lines. **Principal Leaseholders:** Stanolind, Humble, Continental, W. L. Goldston. **Remarks:** Water level was found in the discovery well at 6154 ft but later established at 6140 ft. This field has one of the thickest sand bodies on the Gulf Coast. Stanolind operates a gasoline plant in the field.

HOSKINS MOUND (Abandoned)

8 mi se Danbury. **Discovery Data:** Structure by surface indications of elevation, gas seeps and sulphur water. Field by Mound Oil Co.'s Fee 1 completed in 1904. **Structure:** Piercement type salt dome, cap rock 623 ft, salt 1150 ft. **Producing Formations:** Oil from sands 600 ft, sulphur from cap rock. **Production through 1908:** 100,185 bbls. **Deepest Test:** 4126 ft in Miocene. **Remarks:** Between 1905 and 1910 the Mound Oil Co. drilled 28 tests. A total of 45 wells were drilled before exploration for oil stopped in favor of sulphur production, commenced in 1925 by the Freeport Sulphur Co.

LIVERPOOL (Distillate)

1½ mi se Liverpool. Angier, Hall & Bradley Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Pan American Prod. Co.'s Callihan 1, completed Aug. 24, 1946. **Structure:** Deep seated salt dome, faulted. **Production Formation:** Frio 8757-62 ft. **Production in 1949:** 1728 bbls; through 1949: 7852 bbls; daily, March 1, 1950; Shut in. **Gravity:** 40.3°. **Producing Wells March 1, 1950:** 0 with 1 rig running. **Deepest Test:** Discovery well at 12,204 ft in Frio. **Oil Outlet:** Pan American. **Principal Leaseholder:** Pan American.

LOCHRIDGE

2 mi sw of Andrew. J. W. Hall, A. Robinson, T. Alsberry Surveys. **Discovery Data:** Structure by Gulf's torsion balance in 1929. Humble & Shell checked by refl. seismograph. Field by Gulf's Wilkes & Smith 2-A completed Nov. 9, 1936. **Structure:** Probable deep seated dome, faulted. **Producing Formations:** Marginulina 6230-6345 ft (gas), Frio 6350-65 ft. **Production in 1949:** 345,301 bbls; through 1949: 7,845,188 bbls; daily, March 1, 1950: 850 bbls. **Producing Wells, March 1, 1950:** 33 with no rigs running. **Gravity:** 28°. **Deepest Test:** Gulf's Great Southern Life Ins. Co. 1 at 9684 ft in Vicksburg. **Oil Outlet:** Gulf Pipe Line Co. 4-in. **Principal Leaseholders:** Gulf, Shell, Grubb & Hawkins. **Remarks:** Some consider Gulf's Fairfield 1, which made 85 bbls. of 42-gravity oil on March 26, 1936, and then completed as gasser, as the discovery well.

MANVEL

2 mi ne Manvel, 10 mi s Houston. **Discovery Data:** Structure by surface geology and Texas Co. torsion balance in 1929, checked by reflection seismograph. Field by The Texas Co.'s Belcher A-1 completed Sept. 9, 1931. **Structure:** Deep seated dome, faulted. **Producing Formations:** Miocene 3686-4604 ft, Marginulina and Frio 5023-5733 ft. **Production in 1949:** 2,106,324 bbls; through 1949: 41,945,939 bbls; daily, March 1, 1950: 4800 bbls. **Producing Wells, March 1, 1950:** 164 with 1 rig running. **Gravity:** 24-30°. **Deepest Test:** Skelly's Shepard Unit 1, 8362 ft in Vicksburg. **Oil Outlets:** Texas Co. 8-in & Crown Central pipe line. **Principal Leaseholders:** The Texas Co., J. S. Abercrombie and Magnolia, C. P. Burton, R. H. Dearing, Gulf. **Remarks:** Three new oil horizons at 4040 ft, 4534 ft, and 5612 ft found in 1949.

OLD OCEAN

2 mi nw of Sweeney. **Discovery Data:** Structure by reflection seismograph, Harrison & Abercrombie, 1934. Field by Harrison & Abercrombie's Bernard River 1 completed Nov. 8, 1934. **Structure:** Deep seated dome. **Producing Formations:** Frio 8629-11,321 ft. **Production in 1949:** 5,088,367 bbls; through 1949: 57,475,904 bbls; daily, March 1, 1950: 13,679 bbls. **Producing Wells, March 1, 1950:** 148 with 2 rigs running. **Gravity:** 36-60°. **Deepest Test:** Harrison & Abercrombie's McDonald B-1, 14,378 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** Abercrombie & Magnolia, Stanolind, Tide Water, The Texas Co. **Remarks:** Abercrombie & Magnolia are the big owners in this field, which is over 7 miles long and 3 miles wide.

PEACH POINT (Distillate)

7 mi se Brazoria, 4 mi ne Allen dome. S. F. Austin Survey. **Discovery Data:** Field by Gulf Oil Corp.'s S. S. Perry et al 1, completed April 20, 1949. **Producing Formation:** Frio 11,278-348. Production in **1949:** 15,708 bbls. **Producing Wells, March 1, 1950,** 1 with no rigs running. **Gravity:** 44.2° **Deepest Test:** Discovery well at 12,984 ft in Frio. **Principal Leaseholder:** Gulf.

PLEDGER (Distillate)

3 mi se Pledger. **Discovery Data:** Structure by reflection seismograph in 1932. Torsion balance work was done in 1925. Field by Danciger O & R Co.'s W. S. Hunt 1, completed Dec. 2, 1932. **Structure:** Probable deep seated dome. **Producing Formations:** Frio 6540-7825 ft. **Production:** All production goes to gasoline plant and no gauge made on lease. **Gravity:** 47.5-58°. **Deepest Test:** Humble's Smith 4, 9096 ft in Vicksburg. **Principal Leaseholders:** Humble, Danciger. **Remarks:** Danciger operates gasoline plant in field.

ROWAN

3 mi n Liverpool, Wm. Harris, Hooper & Wade, S. T. Angier & S. F. Austin Surveys. **Discovery Data:** Structure by refraction seismograph, Texas Co. reflection seismograph, 1934-35. Area also worked by Humble, Pure, Sun and Stanolind seismograph crews. Field by Rowan and Nichols' Hubbard 1, completed June 30, 1940. **Structure:** Deep seated salt dome. **Producing Formations:** Frio 8550-62 ft, Hackberry 8952-9137 ft. **Production in 1949:** 232,289 bbls; through 1949: 2,563,164 bbls; daily, March 1, 1950: 557 bbls. **Producing Wells, March 1, 1950:** 10 with no rigs running. **Gravity:** 41-56° **Deepest Test:** Discovery well at 10,008 ft in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholders:** Rowan Oil Co., Humble, Stanolind.

SANDY POINT

2 mi ne Sandy Point in D. Talley Survey. **Discovery Data:** Structure by Stanolind reflection seismograph and torsion balance in 1933-36. Field by Henry De Arman's Fite 1 completed Jan. 27, 1937. **Structure:** Deep seated dome. **Producing Formations:** Marginulina **6450-75 ft, Frio** 6480-6504 ft. **Production in 1949:** 23,913 bbls; through 1949: 499,728 bbls; daily, March 1, 1950: 51 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 41°. **Deepest Test:** Stanolind's Alexander Sharp 1 at 8943 ft in Vicksburg. **Oil Outlet:** Sinclair pipe line. **Principal Leaseholder:** J. A. Fite. **Remarks:** Field sometimes referred to as Juliff.

STRATTON RIDGE

2½ mi e of Clute. J. E. Groce, T. W. Grayson Surveys. **Discovery Data:** Structure by surface geology in 1913. Reflection seismograph survey in 1930. Field by E. Cockrell's Seaburn Est. Hrs. 3, completed Oct. 30, 1945. **Structure:** Piercement type salt dome with production from northeast quadrant. **Producing Formations:** Miocene 3940-66, 4135-4142 ft, Marginulina 4567-4986 ft. **Production in 1949:** 207,192 bbls; through 1949: 457,033 bbls; daily, March 1, 1950: 550 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 25-29.6°. **Deepest Test:** Sterling O & R Co.'s F. W. Shanks et al 1 at 9267 feet in Oligocene. **Oil Outlet:** Houston Pipe Line Co. **Principal Leaseholder:** E. Cockrell. **Remarks:** Freeport Sulphur Co.'s Tolar & Dannenbaum 1 found first commercial oil in 1922, but production stopped 1924. Reopened by Amerada-Rycade in 1932, but once again died in 1933. Over 60 tests were drilled on this structure before commercial production obtained.

WEST COLUMBIA

Adjoins town of West Columbia on northwest. J. H. Bell, Geo. Tennille, M. Varner Surveys. **Discovery Data:** Structure by surface

An insert map of the Texas-Louisiana Gulf Coast accompanies this issue. This map has been adapted from Lee Jerome Wilson's "Gulf Coast Map of Texas, Louisiana and Mississippi," 1-inch to 10-mile scale. This original map shows all oil, gas and condensate fields with oil, gas, product trunk pipe lines, plants, etc.

A larger 1-inch to 10-mile scale hand-colored copy of the map included in this issue, suitable for mounting as a wall map, is available in one piece, 24 inches by 55 inches. Price of this map on paper blue line print, hand colored in three colors for oil, gas and condensate fields is $20.00.

Descriptive literature of other maps may be obtained from L. J. Wilson Map Company, Box 6277, Houston 6, Texas.

indications of elevation and gas seeps. Field by Tyndall-Wyoming Oil Co.'s Hogg 1 completed Sept. 7, 1915. **Structure:** Piercement type salt dome, cap rock 700 ft., salt 800 ft. **Producing Formations:** Pliocene-Miocene and Marginulina-Frio, 354-5800 ft, Vicksburg 5968-6705 ft. **Production in 1949:** 2,656,383 bbls; through 1949: 108,629,357 bbls; daily, March 1, 1950: 7351 bbls. **Producing Wells, March 1, 1950:** 168 with 1 rig running. **Gravity:** 18-57.6°. **Deepest Test:** The Texas Co.'s E. H. Mayes et al 1 at 9646 feet in salt. **Oil Outlets:** Humble Pipe Line Co. 8-in, Texas Co. 8-in, Sinclair. **Principal Leaseholders:** Hogg Oil, Humble, Gulf, Texas Co., Sterling Oil, J. G. Phillips. **Remarks:** Area includes: W. Columbia, Old; W. Columbia, New; W. Columbia, Deep.

BRAZOS COUNTY

MILLICAN (Gas)

1 mi w of Millican. E. M. Millican, J. M. Barrera, W. M. Devers Survey. **Discovery Data:** Structure: by reflection seismograph and surface geology. Field by Phillips Petroleum Co.'s Jericho 1, completed in May, 1942. **Structure:** Salt dome with salt found as high at 5170 ft. **Producing Formations:** Wilcox 3104-07, 3340-48 ft. **Deepest Test:** Phillips' Schoeps 3, at 16,655 ft in L. Cretaceous. **Principal Leaseholder:** Phillips. **Remarks:** The deepest test in this field was abandoned in 1945 and at that time held the world's depth record.

BURLESON COUNTY

CHREISMAN

4 mi n of Chreisman in Eliza Sante Survey. **Discovery Data:** Structure by surface fault. Field by Red Bank Oil Co.'s H. H. Coffield 1, completed on Aug. 13, 1938. **Structure:** Local fault along Luling-Mexia fault line. **Producing Formations:** Navarro 3440-50 ft, Edwards 6167-73 ft. **Production in 1949:** 2283 bbls; through 1949: 20,281 bbls; daily, March 1, 1950: 5 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 34.5-37° **Deepest Test:** Red Bank Oil Co.'s Nellie Gramm 1, 6241 ft in Edwards. **Oil Outlet:** Trucks. **Principal Leaseholder:** Creslenn Oil Co. **Remarks:** Field was first named Red Bank and abandoned in 1940. Revived in 1947 by Creslenn Oil Co., and renamed.

CHAMBERS COUNTY

ANAHUAC

6 mi e of Anahuac. **Discovery Data:** Structure by Humble torsion balance and reflection seismograph in 1932 and 1934. Shell, Sun, Yount-Lee, Pure and Amerada did geophysical work in the area the latter part of 1934. Field by Humble's A. Middleton 1, completed March 3, 1935. **Structure:** Regarded deep seated dome, faulted. **Producing Formations:** Marginulina 6800-55 ft, Frio 7200-55 ft. **Production in 1949:** 7,098,233 bbls; through 1949: 96,089,058 bbls; daily, March 1, 1950: 16,069 bbls. **Producing Wells, March 1, 1950:** 344 with no rigs running. **Gravity:** 34-56°. **Deepest Test:** J. C. Means, Jr.'s J. T. White et al 1 at 8969 ft in Frio. **Oil Outlets:** Humble Pipe Line Co. 6-in, Gulf Pipe Line 4-in, Pan American and Sun pipe lines. **Principal Leaseholders:** Humble, Sun, Gulf, Continental.

BARBERS HILL

Centers around town of Mont Belvieu. **Discovery Data:** Structure by surface geology of pronounced mound at surface, gas seeps, paraffin dirt and sulphur water. Field by Gulf & Humble's Chamber's County Agricultural Assn. 4, completed April 16, 1916. **Structure:** Piercement type "mushroom" salt dome, cap rock 350 ft, salt 1000 ft. **Producing Formations:** Super-Caprock: 600-2650 ft; Caprock; 1065-2230 ft; Miocene: 2956-4150 ft; Anahuac: 4175-5650 ft; Frio: 4648-6640 ft; Vicksburg: 6500-8500 ft. **Production in 1949:** 1,957,967 bbls; through 1949: 89,939,607 bbls; daily, March 1, 1950: 5926 bbls. **Producing Wells, March 1, 1950:** 132 with 3 rigs runnings. **Gravity:** 25-35°. **Deepest Test:** The Texas Co.'s Kirby Pet. Co. 1, at 12,855 ft in Yegua. **Oil Outlets:** Humble 8-in, Sun 6-in, Atlantic 6-in, Gulf, Texas, Sinclair pipe lines. **Principal Leaseholders:** Texas Gulf Producing Co., Mills Bennett, Humble, Stanolind, Sun, Sunray. **Remarks:** Inflammable gas found in water well drilled to 65 ft in 1889. On nearly all sides of the structure salt flares out at the top of the core, giving a mushroom effect. Wells are drilled through the salt and cap rock overhang back into sedimentary formations where much of the production is found.

CEDAR BAYOU

West of Cotton Lake. C. Smith and Chambers CSL Surveys. **Discovery Data:** Structure by reflection seismograph, Ingot and Merit Oil Co., 1937. Field by Ingot and Merit Co.'s Wright 1 completed Dec. 20, 1937. **Structure:** Deep seated salt dome. **Producing Formations:** Marginulina 6425-30, 6444-51 ft. (Gas) Frio 7181-83 ft. **Production in 1949:** 9030 bbls; through 1949: 55,795 bbls; daily, March 1, 1950: 35 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 35°. **Deepest Test:** Butcher-Arthur's 1st Nat. Bank of Goose Creek 1, 7517 ft in Frio. **Oil Outlet:** Sun pipe line. **Principal Leaseholder:** Manford C. Susman.

CEDAR POINT

1 mi offshore Cedar Point in Galveston Bay. **Discovery Data:** Structure by Salt Dome Oil Corp. and Standard of Texas torsion balance, 1934-1936. Reflection seismograph worked in 1937. Field by Standard of Texas and Salt Dome's State 1-118 completed Jan. 12, 1938. **Structure:** Believed deep seated salt dome. **Producing Formations:** Miocene 3050-4490 ft, Frio 5934-6018 ft. **Production in 1949:** 800,943 bbls; through 1949: 5,754,103 bbls; daily, March 1, 1950: 2562 bbls. **Producing Wells, March 1, 1950:** 37 with no rigs running. **Gravity:** 28-37°. **Deepest Test:** Humble's State-Galveston Bay 4-127 at 9922 ft. in Vicksburg. **Oil Outlets:** Humble 8-in, and Pasotex pipe lines. **Principal Leaseholders:** Standard of Texas, Humble. **Remarks:** First of Texas' marine oil fields.

COTTON LAKE

3 mi s of Barbers Hill. J. Townsend and B. Winfree Surveys. **Discovery Data:** Structure by reflection seismograph and torsion balance, Glenn McCarthy, Atlantic Oil, 1936. Field by McCarthy's Kilgore 1, completed Aug. 8, 1936. **Structure:** Probable deep seated dome. **Producing Formations:** Frio 6276-6348, 6450-6530, 6807-17 ft. (Gas). **Production in 1949:** 30,529 bbls; through 1949: 1,253,522 bbls; daily, March 1, 1950, 89 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 29.6-30°. **Deepest Test:** Humble's Flewellen 1, at 8580 ft in Vicksburg. **Oil Outlet:** Sun Pipe Line Co. 4-in to Sabine Pass. **Principal Leaseholder:** Humble. **Remarks:** Also known as Cotton Lake North field.

COTTON LAKE, SOUTH

40 mi E Houston. B. J. Winfree, S. Barrow, and Jas. Grant Surveys. **Discovery Data:** Structure by torsion balance survey in 1934. (Salt Dome Oil Corp.) Field by Salt Dome Oil Corp.'s Lawrence 1-A in Nov., 1935. **Structure:** Domal anticline. **Producing Formations:** Marginulina 6454-6490, Frio "No. 1" 6495-6525, "No. 2" 6506-6532 ft. **Production in 1949:** 122,381 bbls; through 1949: 4,411,055 bbls; daily, March 1, 1950: 389 bbls. **Producing Wells, March 1, 1950:** 26 with no rigs running. **Gravity:** 32°. **Deepest Test:** Salt Dome's Williams 4, at 8520 ft in Vicksburg. **Oil Outlet:** Sun 4-in pipe line. **Principal Leaseholders:** Humble O & R Co., & Salt Dome Oil Corp. **Remarks:** Includes Cotton Lake, East, opened in 1939 by Salt Dome.

DOUBLE BAYOU (Distillate)

6 mi s Anahuac. Evan Douthit, R. O. W. McManus Surveys and State Tr. 21-D. **Discovery Data:** Structure by reflection seismograph by Salt Dome Oil Corp. in 1937. Field by Salt Dome's Ogden 1 in Oct., 1938. **Structure:** Gentle anticline bounded by SW-NE fault on north. **Producing Formations:** Frio 7515-25, 7550-62, 9000-50 ft. **Production in 1949:** 38,449 bbls; through 1949: 1,129,918 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs runnings. **Gravity:** 60.6°. **Deepest Test:** 10,345 ft in Frio. **Oil Outlets:** Humble and United Gas pipe lines. **Principal Leaseholders:** Unitized by Humble, General Crude, Salt Dome & Standard of Texas, Rowan Drlg. Co., and A. H. & C. H. Rowan. **Remarks:** This field once called South Anahuac and Ash Point.

DOUBLE GUM (Abandoned)

6½ mi nw Winnie. F. W. Plummer & T&NO Surveys. **Discovery Data:** Structure by reflection seismograph by Sun Oil Co. Field by Sun Oil Co.'s Moore Est. 1, completed May 10, 1945. **Structure:** Faulted anticline. **Producing Formation:** Frio 8280-90 ft. **Production Total:** 1,013 bbls. **Gravity:** 37.6°. **Deepest Test:** Discovery well at 9750 ft in Frio. **Principal Leaseholder:** Sun Oil Co. **Remarks:** Area produced for only 2 months in 1945.

ELM BAYOU (Distillate)

5 mi se Stowell. HT&B Survey. **Discovery Data:** Structure by reflection seismograph survey by The Texas Co. in 1944. Field by The Texas Co.'s J. Connerly 1-A, completed April 6, 1945. **Structure:** Closure against faulting. **Producing Formation:** Frio 8394-8415 ft. **Production in 1949:** 8,068 bbls; through 1949: 29,988 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 52.9°. **Deepest Test:** Discovery well at 8609 ft in Frio. **Oil Outlets:** Trucks. **Principal Leaseholders:** Texas Co., Sun, Frost Brothers.

FIG RIDGE

3 mi n Seabreeze field. **Discovery Data:** Structure by reflection seismograph and gravity meter surveys. **Field by** Sun Oil Co.'s Clara Smith et al 1, completed June 28, 1940. **Structure:** Deep seated salt dome, faulted. **Producing Formations:** Frio 8152-8853 ft. **Production in 1949:** 857,585 bbls; through 1949: 12,977,182 bbls; daily, March 1, 1950: 1902 bbls. **Producing Wells, March 1, 1950:** 72 with no rigs running. **Gravity:** 34.6-52°. **Deepest Test:** Sun's H. Meckelburg & C. C. & F. W. Campbell Unit 2-1 at 9785 ft in Frio. **Oil Outlet:** Sun Pipe Line Co. 6-in. **Principal Leaseholders:** Sun, Texas Co., J. M., C. M. & V. W. Frost. **Remarks:** This field separated from Elm Bayou field by fault.

FISHERS REEF

In section 46 of Galveston Bay. **Discovery Data:** Structure by reflection seismograph (Humble). Field by Humble's State 2-C-46 completed Nov. 15, 1940. **Structure:** Deep seated salt dome. **Producing Formations:** Frio 8750-56 ft, Hackberry 8962-64 ft. **Production in 1949:** 68,691 bbls; through 1949: 399,873 bbls; daily, March 1, 1950: 131 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 32.6-35.8°. **Deepest Test:** Humble's State 5-C-45 at 9952 ft in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholder:** Humble.

JACKSON PASTURE

9 mi s of Anahuac. **Discovery Data:** Structure by reflection seismograph in 1929 (Humble & Pure). Field by Wynn Crosby Drlg. Co. et al's J. E. Jackson 1, completed July 6, 1943. **Structure:** Deep seated salt dome, faulted. **Producing Formations:** Marginulina-Frio 8074-8114, 8125-36 ft, Frio 8828-36, 8886-92 ft (gas). **Production in 1949:** 194,709 bbls; through 1949: 434,444 bbls; daily, March 1, 1950: 206 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 40.1-59.4°. **Deepest Test:** Gulf's State 60-1, 10,016 ft. in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholders:** Texas, Gulf Prod. McCarthy. **Remarks:** This field also known as Jackson's Lake and Jackson's Ranch.

JERGINS

Just e of Cedar Bayou field in C. Smith Survey. **Discovery Data:** Structure by reflection seismograph & subsurface geological work. Field by Kirby Petr. Co.'s Fee (Tract 20) 1, completed June 14, 1947. **Structure:** Probable faulted area. **Producing Formations:** Marginulina 6312-16, 6395-99 ft, Frio 6397-6433, 6440-44 ft. **Production in 1949:** 305,921 bbls; through 1949: 708,238 bbls; daily, March 1, 1950: 716 bbls. **Producing Wells, March 1, 1950:** 18 with no rigs running. **Gravity:** 37-49.6°. **Deepest Test:** Discovery well at 8015 ft in Frio. **Oil Outlet:** Atlantic P. L. Co. **Principal Leaseholders:** Kirby Petr. Co., The Texas Co. **Remarks:** First called Goose Creek East, then Cotton Lake South.

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LOST LAKE

5 mi e Barbers Hill and 7 mi nw Anahuac. **Discovery Data:** Structure by surface indications and refraction seismograph survey made by Pure in 1927. Torsion balance first indicated structure in 1925. Field by Pure's Mayes 1, completed March 30, 1929. **Structure:** Piercement type salt dome, cap rock 3272 ft, salt 5430 ft. **Producing Formations:** Miocene 1737-44, 2000-71, 2200-15 ft (all gas), Marginulina 2700-2825 ft. **Production in 1949:** 412 bbls; through 1949: 1,056,532 bbls; daily, March 1, 1950, 3 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 20-23°. **Deepest Test:** Gulf's Mayes 1 at 9943 ft in salt. **Oil Outlet:** Humble 4-in. **Principal Leaseholder:** John W. Mecom. **Remarks:** Originally opened as gas field. First oil was discovered by Pure in 1929.

MAYES

10 mi s of Anahuac. Wm. Bryan & Lewis Matthews Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Humble's Mary Etta Mayes 1 completed in Dec. 1944. **Structure:** Deep seated dome, faulted. **Producing Formations:** Frio 8166-8215 ft. **Production in 1949:** 58,129 bbls; through 1949: 491,151 bbls; daily, March 1, 1950: 139 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 41.8°. **Deepest Test:** Humble's Mayes 2 at 10,025 ft in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholder:** Humble. **Remarks:** Field separated from Jackson Pasture field by fault.

MAYES, SOUTH

1½ mi se Mayes field. **Discovery Data:** Structure by reflection seismograph (Humble). Field by Humble O & R Co.'s Wallis 1, completed March 9, 1946. **Structure:** Major E-W fault. **Producing Formations:** Frio 8795-12,026 ft. **Production in 1949:** 368,905 bbls; through 1949: 538,799 bbls; daily, March 1, 1950: 1122 bbls. **Producing Wells, March 1, 1950:** 10 with 2 rigs running. **Gravity:** 37-60.8° **Deepest Test:** Humble's Lula Wallis et al 2, at 12,495 ft in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholder:** Humble O & R Co. **Remarks:** Humble's South Mayes Unit 1-1, which produces at 12,026 ft was Texas' deepest producer for several years. Includes Mayes, East.

OYSTER BAYOU

8 mi sw of Seabreeze. **Discovery Data:** Structure by seismograph and subsurface geology in 1941. Field by Sun's Jackson et al 3, completed April 23, 1941. **Structure:** Deep seated dome, faulted. **Producing Formations:** Frio 8230-8383 ft. **Production in 1949:** 2,908,395 bbls; through 1949: 17,851,438 bbls; daily, March 1, 1950: 6603 bbls. **Producing Wells, March 1, 1950:** 36 with no rigs running. **Gravity:** 36° **Deepest Test:** Sterling O&R Corp.'s J. D. Eula Cline 1 at 9063 in Frio. **Oil Outlet:** Sun pipe line. **Principal Leaseholders:** Sun and Middleton.

OYSTER BAYOU, SOUTH (Shut-in)

1¼ mi s of Oyster Bayou field, Section 125, T&NO Survey. **Discovery Data:** Field by Sun Oil Co.'s Felix Jackson 30, completed Feb. 1949. **Producing Formation:** Frio 9543-46 ft. **Production:** Shut in since discovery. **Deepest Test:** Discovery well at 10,250 ft. **Principal Leaseholder:** Sun.

OYSTER BAYOU, NORTH (Distillate)

1 mi nw Oyster Bayou field. Section 81, E. Moss Survey. **Discovery Data:** Field by Sun Oil Co.'s Middleton 1-A, completed March 15, 1949. **Production Formation:** Frio 9207-10 feet. **Production in 1949:** 206 bbls; daily, March 1, 1950: shut in. **Gravity:** 48.1°. **Deepest Test:** Discovery well at 9707 ft. **Principal Leaseholder:** Sun.

RED FISH REEF

10 mi se Cedar Point field in Galveston Bay. **Discovery Data:** Structure by Humble reflection seismograph. Field by Humble's State 1-A-247, completed Aug 21, 1940. **Structure:** Deep seated salt dome, faulted. **Producing Formations:** Basal Frio 8670-9798 ft, Hackberry 10,126-11,067 ft. **Production in 1949:** 771, 832 bbls; through 1949: 7,-126,861 bbls; daily, March 1, 1950: 2006 bbls. **Producing Wells, March 1, 1950:** 37 with 1 rig running. **Gravity:** 34-56°. **Deepest Test:** Humble's Galveston Bay-State 32-A, 11,857 ft in Frio (Hackberry). **Oil Outlet:** Humble pipe line **Principal Leaseholder:** Humble. **Remarks:** Discovery was a distillate producer. Humble found oil in 1940.

RED FISH REEF, EAST

1 mi ne Red Fish Reef field in Galveston Bay. State Tract 201. **Discovery Data:** Structure by subsurface geology and reflection seismograph survey. Field by Standard of Texas' State Tract 201-1, completed on Oct. 31, 1946. **Structure:** Fault. **Producing Formation:** Frio 8752-66 ft. **Production in 1949:** 28,089 bbls; through 1949: 73,502 bbls; daily, March 1, 1950: 64 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 53.6°. **Deepest Test:** Discovery well at 11,390 ft in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholder:** Standard of Texas. **Remarks:** Fault separates field from Red Fish Reef field.

SEABREEZE

2 mi nw Seabreeze. T&NO and HT&B Surveys. **Discovery Data:** Structure by reflection seismograph (Sun, 1934). Field by Sun's H. O. Acom 1, completed Nov. 18, 1936. **Structure:** Deep seated salt dome, faulted. **Producing Formations:** Frio 8100-9475 ft. **Production in 1949:** 325,519 bbls; through 1949: 4,455,153 bbls; daily, March 1, 1950, 617 bbls. **Producing Wells, March 1, 1950:** 16 with 1 rig running. **Gravity:** 36.6-53°. **Deepest Test:** Sun's Nemes 1 at 10,388 ft in Frio. **Oil Outlet:** Sun Pipe Line Co. 4-in. **Principal Leaseholder:** Sun. **Remarks:** The discovery well was a distillate producer. Oil discovered by Sun's Acom 3 in 1937.

SMITH POINT

15 mi s of Anahuac in Galveston Bay. **Discovery Data:** Structure by reflection seismograph by Standard of Texas, Humble & others. Field by Standard of Texas' State 1-109 completed in June, 1944. **Structure:** Faulted domal uplift. **Producing Formations:** Frio 8114-54, 8196-8207, 9442-58 ft (gas). **Production in 1949:** 630,909 bbls; through 1949: 3,135,156 bbls; daily, March 1, 1950: 1502 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 40.1-42. **Deepest Test:** Standard of Texas' State-Galveston Bay 1-136 at 10,004 ft in Frio. **Oil Outlets:** Standard of Texas' 6-in pipe line. **Principal Leaseholder:** Standard of Texas.

TURTLE BAY

3 mi e Wallisville, on Turtle Bay. **Discovery Data:** Structure by reflection seismograph & torsion balance surveys (Stanolind 1933-35), Field by Stanolind O&G Co.'s D. Middleton 1, completed Dec. 4, 1935. **Structure:** Deep seated salt dome. **Producing Formations:** Marginulina ("Lotz") 6545-90 ft; Frio 6580-6644 ft. **Production in 1949:** 502,589 bbls; through 1949: 5,860,854 bbls; daily, March 1, 1950: 1386 bbls. **Producing Wells, March 1, 1950:** 38 with no rigs running. **Gravity:** 31-37.3°. **Deepest Test:** 8530 ft in Vicksburg. **Oil Outlet:** Humble 6-in pipe line. **Principal Leaseholders:** Stanolind O&G Co., Sun Oil Co. **Remarks:** Includes Turtle Bay "Lotz sand" field and Turtle Bay, East field, which produce from Marginulina.

WHITE'S LAKE

Ne of Mayes, South field, G. Long Survey. **Discovery Data:** Structure by reflection seismograph. Field by Wynn Crosby Drlg. Co.'s Mayes White 1, completed in Aug., 1944. **Structure:** Faulted dome. **Producing Formation:** Frio 8815-40 ft. **Production in 1949:** 79,635 bbls; through 1949: 88,536 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 57°. **Deepest Test:** 10,507 ft in Frio. **Principal Leaseholder:** Wynn Crosby Drlg. Co.

WILLOW SLOUGH

3 mi sw Seabreeze field. T&NO, HT&B, A. Ybarbo & G. W. Brooks Surveys. **Discovery Data:** Structure by reflection seismograph survey in 1932. Field by Sun Oil Company's J. T. White 2-A completed Jan. 11, 1937. **Structure:** Faulted domal uplift. **Producing Formations:** Frio 8350-54, 8461-70, 8472-80, 8685-8781 (gas), 9476-95 ft (gas). **Production in 1949:** 69,479 bbls; through 1949: 1,374,356 bbls; daily, March 1, 1950: 153 bbls. **Producing Wells, March 1, 1950:** 15 with no rigs running. **Gravity:** 35-46. **Deepest Test:** Sun's R. J. Barrow 5-A at 9482 ft in Frio. **Oil Outlet:** Sun pipe line. **Principal Leaseholder.** Sun Oil Co.

WINNIE, NORTH

3 mi n of Winnie. **Discovery Data:** Structure by reflection seismograph survey. Field by Sun Oil & Shell's Daugherty-Pool 1, completed April 27, 1944. **Structure:** Deep seated dome. Faulted. **Producing Formations:** Frio 8757-9890 ft, Hackberry 10,146-10,875 ft. **Production in 1949:** 286,852 bbls; through 1949: 1,209,459 bbls; daily, March 1, 1950: 695 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 29.7-52.3°. **Deepest Test:** McCarthy's Wiebelhaus 1, 11,566 ft in Frio. **Oil Outlet:** Sun pipe line. **Principal Leaseholders:** Sun, McCarthy, Phillips. **Remarks:** Also called North Stowell.

COLORADO COUNTY

ALTAIR (Distillate)

½ mi nw Altair. P. O'Dougherty, BBB&CRR, Puerto Tierra Irr. Co. Surveys. **Discovery Data:** Structure by reflection seismograph & subsurface geology in Feb., 1933. Field by Superior of Calif.'s M. Tait 2-A, completed July 7, 1945. **Structure:** Faulted anticline. **Producing Formations:** Wilcox 8242-8365, 10,099-192, 10,226-254 ft. **Production in 1949.** no report; through 1949: 414,666 bbls. **Gravity:** 48-57°. **Deepest Test:** Superior Oil Co.'s M. S. Pryor 4-A, 10,366 ft in Wilcox. **Oil Outlets:** Superior pipe line. **Principal Leaseholder:** Superior Oil Co.

BUCK SNAG

4 mi wsw Garwood townsite in I&GN 6 survey. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Shell Oil Corp.'s Schuring Est. 1, completed August 9, 1942. **Structure:** Anticline. **Producing Formation:** Yegua 6120-50 ft. **Production in 1949:** 1423 bbls; through 1949: 24,349 bbls; daily, March 1, 1950: shut in. **Gravity:** 47°. **Deepest Test:** Shell's Union Central Life 1, 7006 ft in Yegua. **Oil Outlet:** Humble pipe line. **Principal Leaseholder:** Shell.

CHESTERVILLE (Distillate)

8 mi ene Eagle Lake in GH&H Survey. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Petr. Co.'s A. H. & B. D. Anderson 1, completed Sept. 1, 1943. **Structure:** Faulted anticline. **Producing Formations:** Yegua 6058-6860 ft, Wilcox 9260-9600 ft. **Production in 1949:** 61,254 bbls; through 1949: 149,609 bbls. **Producing Wells, March 1, 1950:** 8 with no rigs running. **Gravity:** 47-52°. **Deepest Test:** Discovery well at 12,006 ft in Wilcox. **Principal Leaseholder:** Magnolia.

COLUMBUS

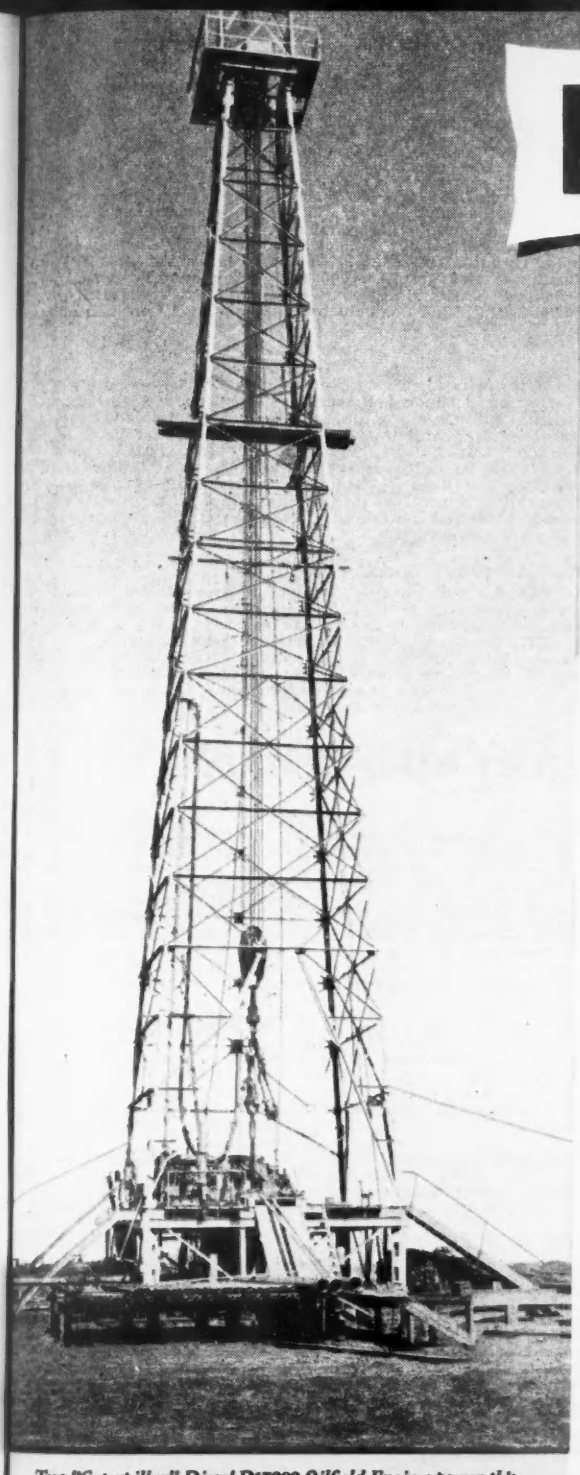
4 mi nw Columbus. J. Tumlinson & Jas. Cummins Surveys. **Discovery Data:** Structure by reflection seismograph, surface & subsurface geology. Field by Cities Service Oil Co.'s C. K. Gay 1, completed March 18, 1944. **Structure:** Fault. **Producing Formations:** Wilcox 7300-8732 ft (7 pays). **Production in 1949:** 10,772 bbls; through 1949: 86,096 bbls; daily, March 1, 1950: 31 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 36.5-62°. **Deepest Test:** Cities Service et al's W. Struss 1, 10,001 ft in Wilcox. **Oil Outlets:** Cities Service pipe line. **Principal Leaseholders:** Cities Service, Texas Gulf Prod., Pan American Prod.

ENGLEHART (Distillate)

5 mi nw Garwood. J. Grant, S. Kennelly Surveys. **Discovery Data:** Structure by reflection seismograph survey. Field by Shell's Kyle Est. 1, completed May 10, 1945. **Structure:** Fault. **Producing Formations:** Wilcox 8780-95, 8882-90, 8928-34, 8948-87 ft. **Production in 1949:** 1943 bbls; through 1949: 12,413 bbls. **Producing Wells, March 1, 1950:** 0 with no rigs running. **Gravity:** 50.2-53.6°. **Deepest Test:** Discovery well at 11,944 ft in Wilcox. **Principal Leaseholders:** Shell, Tide Water, Sun, Texas Gulf Prod.

FRELSBURG (Distillate)

2 mi se Frelsburg. **Discovery Data:** Structure by reflection seismograph & subsurface geology. Field by Sinclair's A. J. Thompson 1, completed June 16, 1944. **Structure:** Faulted anticline. **Producing Formations:** Wilcox 8160-9290 ft (5 pays). **Production in 1949:** 6,341 bbls; through 1949: 22,320 bbls. **Producing Wells, March 1, 1950:** 6 with 1 rig running. **Gravity:** 54.8-59.3°. **Deepest Test:** Sinclair Prairie Oil Co.'s T. Gordon 1, 11,727 ft in Wilcox. **Oil Outlet:** Texas-New Mexico pipe line. **Principal Leaseholder:** Sinclair Oil Co.



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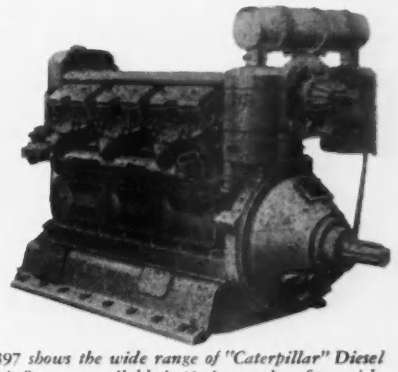

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OILFIELD ENGINES

GARWOOD (Abandoned)

8 mi w Garwood in I&GN RR Survey. **Discovery Data:** Structure by surface geology, confirmed by torsion balance and magnetometer in 1928. Field by Coyle-Concord Oil Co.'s Nelson 1, completed July 17, 1932. **Structure:** Anticline. **Producing Formations:** Catahoula 3800 ft, Frio 4021-52 ft. Cockfield 5922-6096 ft. **Production Total:** 6,198 bbls. **Gravity:** 43°. Deepest Test: W. R. Davis & Co., Inc.'s J. R. McLane 1, 10,536 ft in Wilcox. **Remarks:** Discovery well was a gasser, and Plymouth Oil Co.'s Ream 1 discovered oil in 1933. Both wells went to water and were abandoned.

GARWOOD, WEST

8 mi w of Garwood. W of old Garwood field. **Discovery Data:** Structure by reflection seismograph and torsion balance. Field by W. R. Davis & Co.'s Brownson A-1 completed Jan. 30, 1941. **Structure:** Deep seated dome, faulted. **Producing Formations:** Cockfield 6088-6115 ft, Wilcox 9423-33 ft. **Production in 1949:** 4740 bbls. through 1949: 168,120 bbls; daily, March 1, 1950: 20 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 44°. **Deepest Test:** W. R. Davis, Inc.'s L. E. Brownson 3-A at 10,424 ft in Wilcox. **Oil Outlets:** Trucks. **Principal Leaseholder:** Great Lakes Carbon Corp. **Remarks:** Wilcox is not now producing.

GLASSCOCK

6½ mi n Rock Island in J. Collier Survey. **Discovery Data:** Structure by reflection seismograph. Field by Sinclair's C. G. Glasscock 2, completed Dec. 9, 1944. **Structure:** Fault. **Producing Formations:** Wilcox 9203-80 ft (3 pays). **Production in 1949:** 33,872 bbls; through 1949: 91,045 bbls; daily, March 1, 1950: 78 bbls. **Producing Wells, March 1, 1950:** 4 with 1 rig running. **Gravity:** 51°. **Deepest Test:** Discovery well at 10,518 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholders:** Sinclair Oil Co. & Coast Company.

HAMEL

4 mi sw Glidden in R. Dowdy Survey. **Discovery Data:** Structure by reflection seismograph. Field by Skelly Oil Co.'s R. Hamel 1, completed Aug. 24, 1945. **Structure:** Anticline and sand pinch-out. **Producing Formations:** Wilcox 9032-69, 9070-79 ft. **Production in 1949:** 37,371 bbls; through 1949: 277,954 bbls; daily, March 1, 1950: 112 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 38-53.7°. **Deepest Test:** Skelly Oil Co.'s Boeker 1, 10,159 ft in Wilcox. **Oil Outlet:** Truck. **Principal Leaseholder:** Skelly Oil Company.

KENNELLY (Distillate)

1 mi nw Garwood. Sam Kennelly Survey. **Discovery Data:** Field by The Chicago Corp's John Drlik 1, completed Nov. 18, 1949. **Producing Formation:** 6796-6800 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 56.1°. **Deepest Test:** Discovery well at 10,080 ft. **Principal Leaseholder:** The Chicago Corp.

NADA (Distillate)

3½ mi w of Nada. **Discovery Data:** Structure by reflection seismograph. Field by Ohio Oil Co.'s McDermott 1, completed Feb. 8, 1944. **Structure:** Faulted anticline. **Producing Formations:** Cockfield 6216-20, 6510-20 ft, Yega 6760-65 ft, Wilcox 9910-16 ft. **Production in 1949:** 44,391 bbls; through 1949: 60,389 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 38.4-52.2°. **Deepest Test:** Ohio Oil Co.'s Nada Unit 1-A at 10,336 ft in Wilcox. **Oil Outlets:** Trucks and TGT line for gas. **Principal Leaseholders:** Ohio, Magnolia. **Remarks:** Shut-in after discovery until 1946.

ORANGE HILL, WEST (Distillate—Abandoned)

3 mi ne Ramsey in CTRR Survey. **Discovery Data:** Structure by reflection seismograph. Field by Pan American Prod. Co.'s R. L. Williams 1, completed Jan. 28, 1945. **Structure:** Fault. **Producing Formation:** Wilcox 8368-8400 ft. **Production: Total produced:** 676 bbls. **Deepest Test:** Discovery well at 9250 in Wilcox. **Principal Leaseholder:** Pan American. **Remarks:** Related structurally to Ramsey field; only 2 wells were drilled.

RAMSEY (Distillate)

1 mi e of Ramsey. T. K. Bartleson, W. D. Ramsey Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Cities Service's Stephens 1, completed March 10, 1943. **Structure:** Faulted anticline. **Producing Formations:** Wilcox 8314-42, 8850-73, 8948-70 ft. **Production in 1949:** 17,411 bbls; through 1949: 141,224 bbls; daily, March 1, 1950: 69 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 52-61.8°. **Deepest Test:** Tide Water Assoc. Oil Co.'s G. Goeckler 1 at 10,838 ft in Wilcox. **Oil Outlets:** Truck and gas to Southern Union Gas. **Principal Leaseholders:** Cities Service, Pan American, Tide Water.

ROCK ISLAND (Distillate—Shut In)

5 mi ne Rock Island. SA&MG Survey. **Discovery Data:** Reflection seismograph survey in 1944. Field by Sinclair's F. Fehrenkamp 1, completed May 1, 1945. **Structure:** Faulting associated with folding. **Producing Formation:** Wilcox 9678-9695 ft. **Production: Shut in; Total Produced:** 3,911 bbls. **Gravity:** 50°. **Deepest Test:** Discovery well at 11,000 ft in Wilcox. **Principal Leaseholders:** Sinclair, Gulf, Skelly.

SHERIDAN

3 mi se of Sheridan. **Discovery Data:** Structure by reflection seismograph in 1940. Field by Shell's Plow Realty Co. 1, completed May 10, 1940. **Structure:** A high on down thrown side of fault. **Producing Formations:** Wilcox 8126-45, 8746-56, 9259-9440, 10,089-392 ft. **Production in 1949:** 4,763 bbls of crude—distillate prod included with recycling plant output. **Producing Wells, March 1, 1950:** 5 (crude) with 1 rig running. **Gravity:** 37.8-58.2°. **Deepest Test:** Shell's Plow Realty Co. 5, 11,497 ft in Wilcox. **Oil Outlets:** Shell and Humble pipe lines. **Principal Leaseholder:** Shell.

SUBLIME

3 mi sw of Sheridan. **Discovery Data:** Structure by reflection seismograph. Field by Tide Water's D. L. Underwood 1, completed Dec. 6, 1944. **Structure:** Fault. **Producing Formations:** Wilcox 8034-39, 9430-70, 9495-9536 ft. **Production in 1949:** 112,628 bbls; through 1949: 321,978 bbls; daily, March 1, 1950: 435 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 32-55.4° **Deepest Test:** 10,751 ft in Wilcox. **Oil Outlet:** Scurlock Pipe Line Co. **Principal Leaseholder:** Tide Water.

FAYETTE COUNTY

ARNIM

3½ mi se Elm Grove. J. S. Menefee & Zumwalt Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Continental Oil Co.'s E. A. Arnim 1, completed March 1, 1945. **Structure:** Faulted monocline. **Producing Formation:** Wilcox 2030-60 ft. **Production in 1949:** 32,020 bbls; through 1949: 138,772 bbls; daily, March 1, 1950: 100 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 21°. **Deepest Test:** Discovery well at 5405 ft in Midway. **Oil Outlet:** Scurlock Pipe Line Co. **Principal Leaseholder:** Continental Oil Co.

CISTERN

Just nw Cistern townsite, J. T. Whiteside Survey. **Discovery Data:** Structure by reflection seismograph, surface & subsurface geology. Field by Continental Oil Co.'s Fannie Gabitzsch 1, completed June 6, 1942. **Structure:** Faulted anticline. **Producing Formations:** Reklaw 1160-1200 ft, Wilcox 1930-2870 ft. **Production in 1949:** 9326 bbls; through 1949: 81,581 bbls; daily, March 1, 1950: 26 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 17.3-18°. **Deepest Test:** Continental Oil Co.'s Tom Cockrell 1-A, 7697 ft in Edwards. **Oil Outlet:** Trucks. **Principal Leaseholder:** Meco Prod. Co. **Remarks:** First field in Fayette County.

WALDECK (Pietsch) (Gas—Abandoned)

8 mi n of LaGrange, J. R. Phillips Survey. **Discovery Data:** Structure by surface & subsurface geology & geophysics. Field by Standard Oil of Kansas & Seaboard of Delaware's August Pietsch 1, completed Jan. 18, 1947. **Structure:** Fault. **Producing Formations:** Wilcox 6521-27 ft. **Deepest Test:** Seaboard Oil Co. of Delaware & Standard of Kansas Oeser 1, 7100 ft in Navarro. **Principal Leaseholders:** Seaboard Oil Co. and Standard of Kansas. **Remarks:** Discovery well went to salt water & abandoned in late 1947.

FORT BEND COUNTY

BIG CREEK

6 mi se Rosenburg. **Discovery Data:** Structure by surface indications of gas seeps and sulphur water. Field by Gulf's Wheat 1, completed May 10, 1922. **Structure:** Piercement type salt dome, cap rock 450 ft, salt 650 ft. **Producing Formations:** Pliocene-Miocene 700-2050 ft, Marginulina 2399-3144 ft, Frio 4500-6486 ft. **Production in 1949:** 181,100 bbls; through 1949: 11,202,964 bbls; daily, March 1, 1950: 600 bbls. **Producing Wells, March 1, 1950:** 25 with 1 rig running. **Gravity:** 18-42°. **Deepest Test:** Gulf's W. T. Davis 77 at 8273 ft in Lower Claiborne. **Oil Outlet:** Gulf 6-in. **Principal Leaseholders:** Gulf, Stanolind, Texas. **Remarks:** Sulphur production was attempted by Union Sulphur Co., but was abandoned.

BLUE RIDGE

3 mi se Missouri City. **Discovery Data:** Structure by surface indications of elevation and gas seeps. Field by Gulf's Blakely C-2, completed April 4, 1919. **Structure:** Piercement type salt dome, cap rock 143 ft, salt 230 ft. **Producing Formations:** Miocene 1650-3300 ft, Middle Oligocene 3600-3800 ft, Frio 3900-4112 ft. **Production in 1949:** 182,836 bbls; through 1949: 13,209,695 bbls; daily, March 1, 1950: 735 bbls. **Producing Wells, March 1, 1950:** 57 with no rigs running. **Gravity:** 20-38°. **Deepest Test:** Gulf's B. Luscher et al 1 at 9940 ft in Yegua. **Oil Outlet:** Gulf pipe line. **Principal Leaseholders:** Gulf, Texas Gulf Prod. Co., G. J. Lee, Phillips, Cecil Hagen, Harold Leon, Sam Maceo.

CLODINE

3 mi sw of Clodine. **Discovery Data:** Structure by reflection seismograph. Field by Providence Oil Co.'s E. Hatfield 1, completed June 19, 1941. **Structure:** Fault. **Producing Formations:** Yegua 7258-68 (gas), 7412-20 (gas), 7459-7510 ft. **Production in 1949:** 107,487 bbls; through 1949: 1,744,294 bbls; daily, March 1, 1950: 269 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 42-55°. **Deepest Test:** Gordon Oil Co.'s W. G. Wing 1 at 8394 ft in Cook Mountain. **Oil Outlets:** Stanolind pipe line and Houston P. L. Co. (Gas). **Principal Leaseholders:** Houston Oil Co., Providence Oil Co., Stanolind.

CLODINE, WEST (Distillate)

1½ mi sw Clodine field in I&GN Survey. **Discovery Data:** Structure by subsurface geology & geophysics. Field by Jack W. Frazier and Grubb & Hawkins J. R. Farmer 1, completed Nov. 23, 1947. **Producing Formations:** Cockfield 7260-65, 7415-20 ft. **Production in 1949:** 872 bbls; through 1949: 3,446 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 51-59°. **Deepest Test:** Discovery well at 7665 ft in Cockfield. **Principal Leaseholders:** J. Frazier and Grubb & Hawkins.

McCRARY

4 mi sw Clodine field, Jas. Knight & W. C. White Surveys. **Discovery Data:** Structure by geophysical survey & subsurface geological studies. Field by O. S. Martin (now Atlas O&R Corp.) H. B. McCrary et al 1, completed Dec., 1946. **Structure:** Fault. **Producing Formation:** Yegua 7320-30 ft. **Production:** Only 407 bbls produced since discovery. **Gravity:** 41.5°. **Deepest Test:** Atlas O&R Corp. H. B. McCrary et al 3, 7802 ft in Yegua. **Principal Leaseholder:** Atlas O&R Corp. **Remarks:** Three wells were drilled, but field has never proved commercial.

MOORES (Orchard)

1 mi s town of Orchard. **Discovery Data:** Structure by surface indications and Gulf torsion balance in 1924. Field by Gulf's Moore 5, completed Jan. 18, 1926. **Structure:** Piercement type salt dome, cap rock 285 ft, salt 375 ft. **Producing Formations:** Miocene 900-2500 ft, Frio 2700-4150 ft, Yegua 6675-7721 ft. **Production in 1949:** 161,094 bbls; through 1949: 4,930,553 bbls; daily, March 1, 1950: 411 bbls. **Producing Wells, March 1, 1950:** 13 with 1 rig running. **Gravity:** 20-56°. **Deepest Test:** Gulf's Moore 53 at 10,085 ft in Cook Mountain. **Oil Outlets:** Gulf 6-in and United Gas pipe lines. **Principal Leaseholder:** Gulf. **Remarks:** One of the first seismograph discoveries on Gulf Coast. Seismograph work done for Gulf by "Seismo" G.m.b.H., Hanover, Germany, directed by Dr. L. Mintrop. Sulphur produced from this dome by Duval Sulphur Co.

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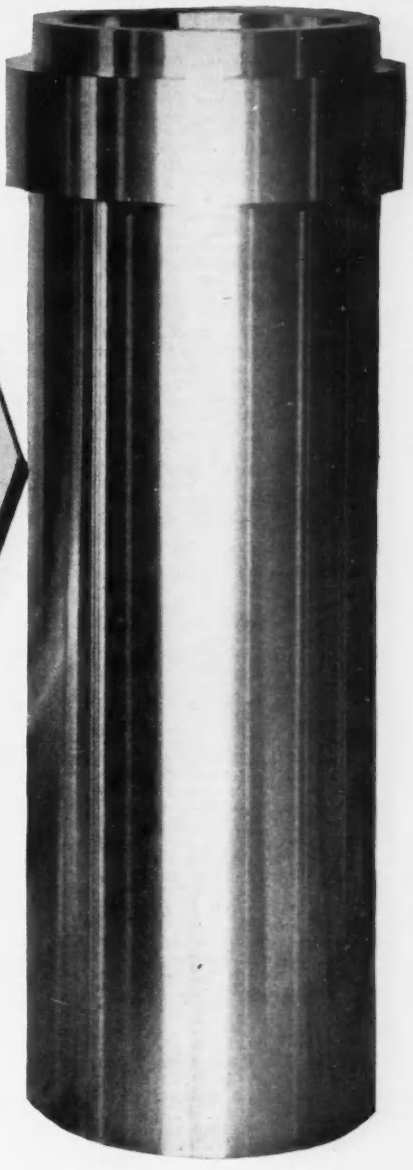

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Lindsay, Okla.	90 days (av.)	27 days (av.)
Chocolate Bayou, Texas	65,000 ft. (av.)	20,000 ft. (max.)
Texas Gulf	27,000 ft. (av.)	10,000 ft. (av.)
Leeville Field, La.	864 hours	240 hours (max.)
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NASH DOME

4 mi e Damon. H. N. Cleveland & T. Alsbury Surveys. **Discovery Data:** Structure by surface indications of elevation, gas seeps, and sulphur water. Dome verified by torsion balance in 1924. Field by Rycade's Nash 5, completed Jan. 2, 1926. **Structure:** Piercement type salt dome, cap rock 625 ft, salt 950 ft. **Producing Formations:** Miocene 4295-4500 ft, Middle Oligocene 4500-4800 ft, Frio 5645-5946 ft. **Production in 1949:** 8,019 bbls. through 1949: 1,775,410 bbls; daily, March 1, 1950: 98 bbls. **Producing Wells, March 1, 1950:** 2 with 1 rig running. **Gravity:** 18-30°. **Deepest Test:** Atlantic's K. Nash Groce 1 at 7936 ft in Vicksburg. **Oil Outlets:** Humble and Gulf pipe lines. **Principal Leaseholder:** Danciger O&R Co. **Remarks:** This was the first torsion balance discovery in U. S. Shallow sulphur wells led to geophysical survey. Abandoned in 1942 after producing 1,724,859 bbls of oil. On October 24, 1945, Danciger discovered the first production on the north flank of the dome from a new sand at 5865-75 ft, in the Theodor Meier 1, production coming from steeply dipping Frio sands near the edge of the salt.

NEEDVILLE

1½ mi se Needville. **Discovery Data:** Structure by Meyer & Sorelle torsion balance in 1928 and checked by other companies. Seismograph found no indications, suggesting no dome unless very deep. Humble and Texas Co. worked with torsion balance in 1935. Humble also worked with magnetometer. Field by W. L. Goldston's Coyle 1, completed Oct. 8, 1941. **Structure:** Deep seated dome. **Producing Formations:** Miocene 3950-4150 ft, Frio 4670-6775 ft. **Production in 1949:** 237,573 bbls; through 1949: 1,742,006 bbls; daily, March 1, 1950: 544 bbls. **Producing Wells, March 1, 1950:** 33 with no rigs running. **Gravity:** 24-55°. **Deepest Test:** Gulf's H. C. Ehlert 1-B at 11,134 ft in Yegua. **Oil Outlet:** Tank cars. **Principal Leaseholders:** British-American, W. L. Goldston.

ROSENBERG

South of Rosenberg, E. Meyers & F. A. Moyers Surveys. **Discovery Data:** Structure by H. C. Cockburn reflection seismograph in 1938. Magnolia and Humble also worked area. Field by Cockburn's Dzierzianowski 1, completed Sept. 22, 1939. **Structure:** Deep seated salt dome, faulted. **Producing Formation:** Yegua 7707-43 ft. **Production in 1949:** 89 bbls; through 1949: 24,169 bbls; daily, March 1, 1950: 1 bbl. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 58°. **Deepest Test:** 8533 ft in Yegua. **Oil Outlet:** Gulf pipe line. **Principal Leaseholders:** H. C. Cockburn, Jack Frazier.

SUGARLAND

5 mi se Sugarland, Wm. Stafford, Wm. Little, E. Alcorn Surveys. **Discovery Data:** Structure by surface indications, subsurface geology and North American Exploration Co. torsion balance for H. C. Cockburn who turned lease over to Humble, who in meantime confirmed dome by refraction seismograph. Field by Humble's Sugarland Industries 1, completed March 26, 1928. **Structure:** Deep seated salt dome, cap rock 3500 ft, salt 4280 ft. **Producing Formations:** Miocene 2900-2950 ft, Marginulina-Frio 3900-50 ft. **Production in 1949:** 1,187,590 bbls; through 1949: 44,911,992 bbls; daily, March 1, 1950: 2,665 bbls. **Producing Wells, March 1, 1950:** 41 with no rigs running. **Gravity:** 27-35°. **Deepest Test:** Humble's Brazos Farms 16, 10,000 ft in salt. **Oil Outlet:** Humble 8-in pipe line. **Principal Leaseholder:** Humble. **Remarks:** At time of discovery Sugarland was a relatively deep dome and stimulated search for deeper domes along Gulf Coast. Pressure maintenance system has been maintained in field since 1930.

THOMPSON

2½ mi s Thompson and 13 mi se Richmond. J. Rabb, S. Kennedy, R. Peebles Surveys. **Discovery Data:** Structure by surface indications and torsion balance survey by Gulf in 1925. Field by Gulf and Cullen & West's Lockwood & Sharp A-1, completed May 21, 1931. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 3050-3250, 3475-3530, 3600-3625, 3950-4000 ft, Marginulina 4850-4900, 5100-5200 ft, Frio 5300-5400 ft. **Production in 1949:** 8,705,488 bbls. through 1949: 112,278,748 bbls; daily, March 1, 1950: 19,835 bbls. **Producing Wells, March 1, 1950:** 218 with no rigs running. **Gravity:** 25°. **Deepest Test:** Gulf-Humble's Scanlan 8, 11,832 ft in Yegua. **Oil Outlets:** Humble 8-in, Gulf 6-in pipe lines. **Principal Leaseholders:** Gulf, Humble, H. M. Naylor, The Texas Co., West Prod. **Remarks:** Field has been known as Clear Lake and Rabb's Ridge.

THOMPSON, NORTH

At north end of Thompson field. **Discovery Data:** Structure by subsurface geological work. Field by H. M. Naylor's O. F. Musselman 1, completed April 9, 1939. **Structure:** Dome. **Producing Formations:** Vicksburg 7700-8070 ft. **Production in 1949:** 1,220,653 bbls; through 1949: 20,403,693 bbls; daily, March 1, 1950: 3,949 bbls. **Producing Wells, March 1, 1950:** 61 with no rigs running. **Gravity:** 36°. **Deepest Test:** Ft. Bend Oil Co.'s A. Williams et al 1-C at 9700 ft in Jackson. **Oil Outlets:** Humble & Gulf pipe lines. **Principal Leaseholders:** Chicago Corp., Christensen & Matthews, Gulf, Palmn Oil Co. **Remarks:** Separated from Thompson field proper by fault.

THOMPSON, SOUTH

At south end of Thompson field. **Discovery Data:** Exploration of dome revealed faulted area to sour of main field. Field was formed by Texas R. R. Commission order separating wells on south side of fault from Thompson (Main) field. **Structure:** Dome. **Producing Formations:** Frio 4250-4370, 5360-5450 ft. **Production in 1949:** 1,792,996 bbls; through 1949: 20,403,693 bbls; daily, March 1, 1950: 3,949 bbls. **Producing Wells, March 1, 1950:** 77 with 1 rig running. **Gravity:** 24-25°. **Deepest Test:** Crosby Drlg. Co.'s A. P. George Est. 1, at 8612 ft in Vicksburg. **Oil Outlets:** Humble & Gulf pipe lines. **Principal Leaseholders:** Humble, Gulf, Cecil Hagen, B. L. Woolley, Quintana.

GALVESTON COUNTY

ALTA LOMA

3 mi sw Alta Loma, 5½ mi nw Hitchcock field. A. Brigham Survey. **Discovery Data:** Structure by reflection seismograph, Humble 1937. Stanolind rechecked with reflection seismograph. Field by Stanolind's Hulen 1, completed May 21, 1940. **Structure:** Closure on fault. **Producing Formation:** Frio 9170-9200 ft. **Production in 1949:** 43,747 bbls; through 1949: 1,233,884 bbls; daily, March 1, 1950: 99 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 37°. **Deepest Test:** Stanolind's Hulen 2 at 11,117 ft in Frio. **Oil Outlet:** Stanolind 6-in pipe line. **Principal Leaseholder:** Stanolind. **Remarks:** The discovery well blew wild while pulling a core and continued to blow wild for 10 weeks. Was finally killed by a relief well completed August 1, 1940. Field was also called Hulen.

CAPLEN

On Bolivar Peninsula. **Discovery Data:** Structure by Sun Oil Co. reflection seismograph in 1935. Field by Sun's Cade Est. 2, completed March 11, 1939. **Structure:** Deep seated salt dome, faulted. **Producing Formations:** Miocene-Oligocene 6159-79, 6242-56, 7138-64, 7200-20, 7355-75, 7625-45 ft. **Production in 1949:** 323,538 bbls. through 1949: 3,390,237 bbls; daily, March 1, 1950: 719 bbls. **Producing Wells, March 1, 1950:** 15 with no rigs running. **Gravity:** 34°. **Deepest Test:** Sun's Humphreys 1, at 8206 ft in Discorbis. **Oil Outlet:** Sun pipe line. **Principal Leaseholders:** Sun, Jas. H. Snowden et al. **Remarks:** Field has been called Bolivar.

DICKINSON-GILLOCK

Just east of Dickinson townsite on Dickinson Bayou. **Discovery Data:** Structure by reflection seismograph, Pure Oil, 1928. Humble and Stanolind also worked the area with geophysical crews. Field by Humble's Maco Stewart A-1 completed August 3, 1934. **Structure:** Large deep seated dome with complex faulting. **Producing Formations:** Frio 8125-9225 ft, 5 sands averaging 35 ft thickness each. **Production in 1949:** 2,201,659 bbls; through 1949: 31,587,738 bbls; daily, March 1, 1950: 8,974 bbls. **Producing Wells, March 1, 1950:** 173 with 1 rig running. **Gravity:** 35-59°. **Deepest Test:** Pan American's Stewart 1-B. 11,517 ft in Frio. **Oil Outlets:** Humble 4-in, Bennett Prod. Co. 4-in and 6-in, Stanolind 6-in, Pan American 4-in. **Principal Leaseholders:** Atlantic, Humble, Pure, J. K. Hughes, John W. Mecom, Midstates Oil Corp., Pan American, Stanolind, Three Bee Investment Co. **Remarks:** At one time Gillock and Gillock S. E. were classed as separate fields from Dickinson. Now it is generally agreed that they are all one structure with large faults and grabens separating the producing areas.

GREENS LAKE (Abandoned)

6 mi sw Hitchcock. **Discovery Data:** Structure by Sun reflection seismograph in 1935. Humble torsion balance in 1928 indicated some type of structure. Field by Sun's Hughes 1 completed June 4, 1936. **Structure:** Probable deep salt dome. **Producing Formations:** Pliocene-Miocene 2740-6685 ft. **Production: Total Produced:** 133,330 bbls. **Gravity:** 21-31°. **Deepest Test:** Discovery well at 9636 ft in Marginulina. **Principal Leaseholder:** Sun. **Remarks:** Was also known as Hughes Ranch.

HANNAH REEF (Distillate)

8 mi n Port Bolivar in Galveston Bay Sur. Sect. 232. **Discovery Data:** Field by Sun Oil Co.'s State 1, completed Feb. 17, 1949. **Producing Formation:** 10,674-688 ft. **Production in 1949:** 4,696 bbls; through 1949: 4,696 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 52.8°. **Deepest Test:** Discovery Well at 11,009 ft. **Principal Leaseholders:** Sun Oil.

HIGH ISLAND

Adjacent to and surrounds town of High Island. On Gulf of Mexico shore. **Discovery Data:** Structure by surface indications of elevation, gas seeps and mineral waters. Refraction seismograph survey made in 1934. Field by Patton Oil Co.'s Cade 1, completed April 12, 1922. **Structure:** Piercement type salt dome, cap rock 130 ft, salt 1300 ft. **Producing Formations:** Miocene 2900-5000 ft, Discorbis 5700-6200 ft, Marginulina 6200-7345 ft. **Production in 1949:** 1,904,507 bbls; through 1949: 26,657,595 bbls; daily, March 1, 1950: 5,948 bbls. **Producing Wells, March 1, 1950:** 99 with 5 rigs running. **Gravity:** 23-40°. **Deepest Test:** 7649 ft in Frio. **Oil Outlet:** Stanolind 10-in. **Principal Leaseholders:** Stanolind, John W. Mecom.

HITCHCOCK

10 mi nw Galveston, centering J. Spillman and A. Burke Surveys. **Discovery Data:** Structure by surface indications and Shell's torsion balance and reflection seismograph surveys from 1929 through 1936. Field by Maco Stewart's Fee 1 completed Sept. 5, 1937. **Structure:** Deep seated dome, faulted. **Producing Formations:** Miocene 5130-55, 6511-64 ft. **Production in 1949:** 251,743 bbls; through 1949: 2,663,830 bbls; daily, March 1, 1950: 706 bbls. **Producing Wells, March 1, 1950:** 20 with no rigs running. **Gravity:** 31-36°. **Deepest Test:** Stewart Inc.'s Fee 14, 12,588 ft in Frio. **Oil Outlet:** Maco Stewart 4-in to Texas City. **Principal Leaseholder:** Stewart Pet. Co.

LEAGUE CITY

3 mi sw League City. Perry & Austin and S. F. Austin Surveys. **Discovery Data:** Structure by Midwest Royalty Corp.'s seismograph survey in 1937. Field by Midwest's Lobit 1, completed Oct. 22, 1938. **Structure:** Deep seated dome. **Producing Formations:** Frio 8650-10,962 ft (8 pays). **Production in 1949:** 351,744 bbls; through 1949: 7,319,578 bbls; daily, March 1, 1950: 706 bbls. **Producing Wells, March 1, 1950:** 24 with no rigs running. **Gravity:** 34-42°. **Deepest Test:** Phillips' J. S. Rice Est. 2 at 11,411 ft in Frio. **Oil Outlets:** Pan American and Phillips pipe lines. **Principal Leaseholders:** Phillips, F. L. Karsten. **Remarks:** Production and well data includes League City, North.

LEAGUE CITY, NORTH

1¾ mi n League City field, S. F. Austin Survey. **Discovery Data:** Structure by geophysical survey and subsurface geology. Field by H. L. Hunt's S. E. Wilson, Jr., 1, completed Oct. 15, 1947. **Structure:** Fault. **Producing Formation:** Frio 9654-58 ft. **Production:** Included with League City field. **Gravity:** 44.1°. **Deepest Test:** Discovery well at 10,152 ft in Frio. **Oil Outlet:** Pan American pipe line. **Principal Leaseholder:** H. L. Hunt. **Remarks:** Originally called League City Heights field.

UNNAMED (Distillate)

NE¼ State Tr. 245, 18 mi in Gulf of Mexico. **Discovery Data:** Structure by seismograph. Field by Stanolind O&G Co.'s State Lse. 31700-1, completed Sept. 6, 1949. **Structure:** Dome. **Producing Formation:** 5964-68 ft. **Production:** Shut-in. **Producing Wells, March 1, 1950:** 0 with no rigs running. **Gravity:** 48.6°. **Deepest Test:** Discovery well at 11,017 ft. **Principal Leaseholder:** Stanolind.

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and 4 *The relatively low drill string weight available for wedging the slips into the bowl.*

That's why safety-minded operators throughout the world have adopted Baash-Ross Drill Collar Slips as "must have" rig equipment, because these Slips are *specially designed* to overcome the risks of supporting a drill string in the rotary table. In contrast to the normal fixed-curvature design of rotary slips, the unique multi-segment design of Baash-Ross Drill Collar Slips permits them to w-r-a-p around the drill collar like a chain tong. They take a full slip-proof grip whether the drill collar is new or worn, round or out-of-round. *And they automatically compensate for as much as 1½" change in drill collar diameter — more than ample for modern drilling operations.*

For example, note in the table how a Baash-Ross Drill Collar Slip that fits a 7" diameter drill collar will also fit *any* diameter down to 5½". Adjustment for wear is automatic and continuous throughout the working range!

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Sizes and Operating Ranges of Baash-Ross Drill Collar Slips

SIZE*	Operating Range	
	From	To
A	3"	4½"
B	3¾"	5¼"
C	4¼"	5¾"
D	5½"	7"
E	6¾"	8¼"

*(all sizes available in both "Regular" and "Long" types)

TWO TYPES

Baash-Ross Drill Collar Slips are available in two types —"Regular" and "Long." The "Long" type has extensions above the gripping area to provide a seat for the Baash-Ross Safety Clamp — the clamp that puts a non-slip, *yet removable,* "stop shoulder" on *any* drill collar to compensate for the hazards of flush design when supporting the collar in the table. For complete details see your nearest Baash-Ross representative — or write direct!

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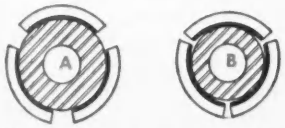
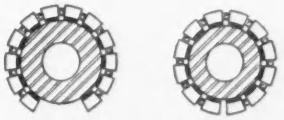


ORDINARY SLIPS that fit the drill collar when new (A) are unable to adjust themselves to smaller diameters as the drill collar wears away. Result, grip becomes less and less adequate (B) and risk of a costly fishing job constantly greater.



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GRIMES COUNTY

TODD (Distillate)

1 mi sw Todd in Wm. Berryman Survey. **Discovery Data:** Field by E. G. Goforth et al's E. G. Goforth 1, completed August 22, 1949. **Producing Formation:** Wilcox 7604-7611 ft. **Production:** Shut in since discovery. **Gravity:** 64.2°. **Deepest Test** Discovery well at 8500 feet. **Principal Leaseholder:** E. G. Goforth. **Remarks:** Grimes county's first commercial oil or gas production.

HARDIN COUNTY

ARRIOLA

2 mi w Voth, E. Arriola Survey. **Discovery Data:** Structure by Gulf's refraction seismograph survey in 1928. Later checked by torsion balance and reflection seismograph. Field by Houston Oil & Republic Prod. Co.'s Arriola 1 completed Sept. 14, 1932. **Structure:** Piercement type salt dome, salt 3933 ft. **Producing Formations:** Miocene 3075-3579 ft, Heterostegina 3825-4320 ft, Frio 4700-13 ft. **Production in 1949:** 121,550 bbls; through 1949: 3,019,344 bbls; daily, March 1, 1950: 161 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 21-40°. **Deepest Test:** Houston Oil & Republic's Arriola 19, 8010 ft in Yegua. **Oil Outlets:** Texas P. L. Co. 6-in & American Pet pipe lines. **Principal Leaseholders:** Houston Oil Co. and American Republic Corp.

BATSON (Old and New)

Adjacent to Batson townsite. 6 mi sw Saratoga. **Discovery Data:** Structure by surface indications, gas seeps and paraffin dirt. Field by Paraffin Oil Co.'s Fee 1, completed Oct. 31, 1903. **Structure:** Piercement type salt dome, cap rock 1080 ft, salt 2050 ft. **Producing Formations:** Miocene 245-1458 ft, Oligocene 2400-4702 ft, Yegua 4896-6250 ft. **Production in 1949:** 251,136 bbls; through 1949: 41,717,292 bbls; daily, through March 1, 1950: 759 bbls. **Producing Wells, March 1, 1950:** 131 with no rigs running. **Gravity:** 20-41°. **Deepest Test:** Shell's Kirby Lumber Co. 1, at 9097 ft. in Yegua. **Oil Outlets:** Sun 6-in & Gulf 6-in pipe lines. **Principal Leaseholders:** Traders Oil Co., Gulf, Ada Bell Oil Co., C. F. Yust, F. W. Elder, J. C. Hawkins, J. G. Carter, B. O. Poole. **Remarks:** John Deering and Batson Oil Co.'s Hooks 1 extended field to the se in 1934. This extension often referred to as Batson, New field.

BEECH CREEK

8½ mi ne Kountze. H&TC and C. M. Votaw Surveys. **Discovery Data:** Structure by reflection seismograph. Field by American Republics Corp. & Houston Oil Co.'s H&TC Fee 1, completed May 16, 1944. **Structure:** Faulted anticline. **Producing Formations:** Yegua 6235-45 ft, Cockfield 6272-82, 6295-6315 6410-19 ft. (Beach Creek, East). **Production in 1949:** 172,040 bbls; through 1949: 466,630 bbls; daily, March 1, 1950: 306 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 35.7-61.7°. **Deepest Test:** Houston Oil & American Republic's H&TC Fee 2, 10,218 ft in Wilcox. **Oil Outlets:** Atlantic and American Pet. pipe lines. **Principal Leaseholder:** American Republics. **Remarks:** Includes Beech Creek, East field.

BEECH CREEK, North

8 mi e Village Mills, H&TC Survey. **Discovery Data:** Structure by reflection seismograph. Field by American Republics & Houston Oil Co.'s O. Sternenberg 1, completed April 9, 1944. **Structure:** Anticline. **Producing Formation:** Yegua 6230-38 ft. **Production in 1949:** 57,977 bbls; through 1949: 255,286 bbls; daily, March 1, 1950: 164 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 35.3°. **Deepest Test:** 7336 in Yegua. **Oil Outlet:** American Pet. Co. pipe line. **Principal Leaseholder:** American Republics Corp.

HAMPTON

3½ mi ne Kountze. A. Hampton League. **Discovery Data:** Structure by reflection seismograph. Field by American Republics-Houston Oil Co.'s Hampton Fee 1, completed June 19, 1942. **Structure:** Fault closure. **Producing Formations:** Yegua 6942-54 ft, Cockfield 7312-15 ft. **Production in 1949:** 8,581 bbls; through 1949: 88,050 bbls; daily, March 1, 1950: 22 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 40.4-43.5°. **Deepest Test:** American Republics' J. Barnett & W. B. Carroll 1 at 8303 ft in Wilcox. **Oil Outlet:** American Pet. pipe line. **Principal Leaseholder:** American Republics Corp.. **Remarks:** Field stopped producing in mid-1945 and was not reopened until two years later when deeper production was found.

OLIVE

3 mi n Olive, 4½ mi n Kountze. **Discovery Data:** Structure by reflection seismograph. Field by Pan American Prod. Co.'s Olive Sternenberg Lbr. Co. 1, completed Nov. 26, 1945. **Structure:** Faulting associated with folding. **Producing Formations:** Wilcox 9700-9806, 10,012-049 ft. **Production in 1949:** 80,517 bbls. through 1949: 349,623 bbls; daily, March 1, 1950: 157 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 39-45°. **Deepest Test:** Pan American's Sternenberg 1-B, 12,946 ft in Wilcox. **Oil Outlet:** American Pet. Co. pipe line. **Principal Leaseholder:** Pan American.

SARATOGA

Adjacent to Saratoga townsite. 12 mi nw Sour Lake. **Discovery Data:** Structure by broken surface, mineral water and gas seeps. Field by Saratoga Oil & Pipe Line Co.'s Hooks 1, completed 1901. **Structure:** Piercement-type salt dome, cap rock 1500 ft, salt 1900. **Producing Formations:** Miocene 500-10 ft, Marginulina 1225-40 ft, Frio 3300-25 ft, Yegua 5849-65, 6675-6700 ft. Cook Mountain 7312-48 ft. **Production in 1949:** 745,254 bbls; through 1949: 33,048,312 bbls; daily, March 1, 1950: 2,107 bbls. **Producing Wells, March 1, 1950:** 259 with 1 rig running. **Gravity:** 15-42°. **Deepest Test:** Falcon-Seaboard's Annie M. Baker 2 at 8533 ft in Cook Mountain. **Oil Outlet:** Sun 6-in, Gulf 6-in. **Principal Leaseholders:** Paggi Brothers, Gulf, Weldon Oil Co., D. D. Feldman, L. M. Josey, H. L. Lewis, Cities Service, Texas, Underwood.

SILSBEE

7 mi n Silsbee. G. W. Brooks & Jos. Ellery Surveys. **Discovery Data:** Structure by torsion balance, Republic Production Co., 1934-35. Field by Republic and Houston Oil Co.'s Brooks Fee 1, completed Aug. 5, 1936. **Structure:** Closure on fault. **Producing Formations:** Yegua 6800-6965 ft, Cook Mountain 7113-8068 ft. **Production in 1949:** 1,110,960 bbls; through 1949: 9,703,849 bbls; daily, March 1, 1950: 3,368 bbls. **Producing Wells, March 1, 1950:** 58 with no rigs running. **Gravity:** 38-43°. **Deepest Test:** American Republic and Houston Oil's Brooks 10, 8904 ft in Wilcox. **Oil Outlets:** Atlantic 4-in and American Pet. pipe lines. **Principal Leaseholders:** American Republics, Humble, General Crude Oil Co. **Remarks:** The discovery well blew out at 6982 feet and caught fire August 7, 1939. Extinguished by Brooks 2 relief well Oct. 2, 1939.

SILSBEE, WEST

4½ mi nw Silsbee. F. P. Williott League. **Discovery Data:** Structure by geophysics and subsurface geology. Field by Republic Production and Houston Oil's Elliott 1, completed April 8, 1941. **Structure:** Fault closure. **Producing Formations:** Yegua 6853-6925 ft, Cook Mountain 7242-58, 7284-96, 7688-7710 ft. **Production in 1949:** 67,365 bbls; through 1949: 408,320 bbls; daily, March 1, 1950: 163 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 40-48.8°. **Deepest Test:** American Republics & Houston Oil's Ellery 2 at 10,702 ft in Wilcox. **Oil Outlets:** Atlantic and American Pet pipe lines. **Principal Leaseholder:** American Republics.

SOUR LAKE

Adjoins Sour Lake townsite on north, S. Jackson, H. Williams and H&TB Surveys. **Discovery Data:** Structure by broken surface, gas seeps & mineral waters. Field by Sour Lake Oil Co.'s Fee 2, completed July 18, 1902. **Structure:** Piercement type salt dome, cap rock 660 ft, salt 719 ft. **Producing Formations:** Pliocene-Miocene 230-1950 ft, Frio 2000-3943 ft, Jackson 4000-5065 ft, Yegua 6335-6952 ft. **Production in 1949:** 1,411,123 bbls; through 1949: 85,733,917 bbls; daily, March 1, 1950: 5,854 bbls. **Producing Wells, March 1, 1950:** 273 with 2 rigs running. **Deepest Test:** The Texas Co.'s Jones 1, 11,509 ft in salt on w flank. **Oil Outlets:** Gulf 6-in, 8-in & 10-in, Texas 12-in, Sun 10-in. **Principal Leaseholders:** Carpenter Prod., Sun, Texas, Cecil Oil Corp., Gulf, Highland Oil Co.

VILLAGE MILLS

1 mi w Village Mills. Hardin CSL and Chas. Stewart Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Republic Prod. & Houston Oil Co.'s Hardin CSL 1, completed Nov. 8, 1944. **Structure:** Fault. **Producing Formations:** Yegua 5795-5810, 5878-82 ft, Wilcox 8964-84, 9025-43 ft. **Production in 1949:** 172,583 bbls; through 1949: 399,336 bbls; daily, March 1, 1950: 466 bbls. **Producing Wells, March 1, 1950:** 9 with no rigs running. **Gravity:** 32.9-69.4°. **Deepest Test:** American Republics & Houston Oil's Rice Institute 2 at 10,636 ft in Wilcox. **Oil Outlet:** American Pet pipe line. **Principal Leaseholders:** Houston Oil Co. & Humble O&R Co.

VILLAGE MILLS, EAST

2 mi se Village Mills field. Geo. Brown League. **Discovery Data:** Field by Houston Oil Co.'s Nona Fletcher Lumber Co. et al 1, completed June 7, 1949. **Producing Formation:** Yegua 7058-66 ft. **Production in 1949:** 188,043 bbls; through 1949: 188,043 bbls; daily, March 1, 1950: 2,539 bbls. **Producing Wells, March 1, 1950:** 25 with 1 rig running. **Gravity:** 41.2°. **Principal Leaseholder:** Houston Oil Co.

VILLAGE MILLS, WEST (Distillate)

5 mi w Village Mills field. Wilbur Cherry Survey. **Discovery Data:** Structure by seismograph. Field by Houston Oil Co.'s Houston Oil & American Republics Fee (Cherry) 1, completed Aug. 4, 1948. **Structure:** Anticline. **Producing Formations:** Yegua 6845-55, 7026-36 ft. **Production in 1949:** 38,492 bbls; through 1949: 41,822 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 61°. **Deepest Test:** Houston Oil & American Rep.'s Davis Fee 1, at 7182 ft. **Principal Leaseholders:** Houston Oil & American Republics.

HARRIS COUNTY

ALDINE

3 mi ne Addicks. E. Farrias Survey. **Discovery Data:** Structure by torsion balance and reflection seismograph, Texas Gulf Producing Co. Field by Texas Gulf's Weary 1, completed May 6, 1939. **Structure:** Deep seated salt dome. **Producing Formations:** Yegua 6638-48, 6795-6800, 6824-34 ft. **Production in 1949:** 26,861 bbls; through 1949: 428,182 bbls; daily, March 1, 1950: 73 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 37-55°. **Deepest Test:** 8006 ft in Yegua. **Oil Outlet:** Texas Gulf Prod. pipe line to Stanolind. **Principal Leaseholder:** Texas Gulf Prod. Co.

ALDINE, SOUTH (Distillate)

1 mi nw Aldine. W. Sevey Survey. **Discovery Data:** Field by F. M. Corzelius' H. H. Rath 1, completed Nov. 11, 1948. **Producing Formation:** Yegua 7089-94, 7361-65 ft. **Production in 1949:** 11,705 bbls; through 1949: 13,137 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 59.6°. **Deepest Test:** Discovery Well at 7773 ft in Yegua. **Principal Leaseholder:** F. M. Corzelius.

ALDINE, WEST (Distillate)

3 mi w Aldine townsite. P. F. Craft & E. Farias Surveys. **Discovery Data:** Structure by reflection seismograph and torsion balance. Field by Geo. W. Strake's Phenix Dairy 1, March 28, 1942. **Structure:** Fault. **Producing Formations:** Yegua 7183-7200, 7528-40 ft. **Production in 1949:** 5,714 bbls; through 1949: 56,586 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 50°. **Deepest Test:** G. W. Strake's Florence & Parker 1 at 8005 ft in Yegua. **Oil Outlet:** Trucks. **Principal Leaseholder:** F. M. Corzelius.

ALIEF

2 mi ne Alief. G. L. Bellows & C. Williams Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Pure Oil Co.'s Mike Albanese 1, completed Feb. 7, 1942. **Structure:** Fault closure. **Producing Formations:** Yegua 7920-30, 8066-80, 8315-25 ft. **Production in 1949:** 32,157 bbls; through 1949: 180,877 bbls; daily, March 1, 1950: 60 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 51.8-52.9° **Deepest Test:** Discovery well at 8711 ft in Yegua. **Principal Leaseholders:** Pure, Cities Service, The Moran Corp.

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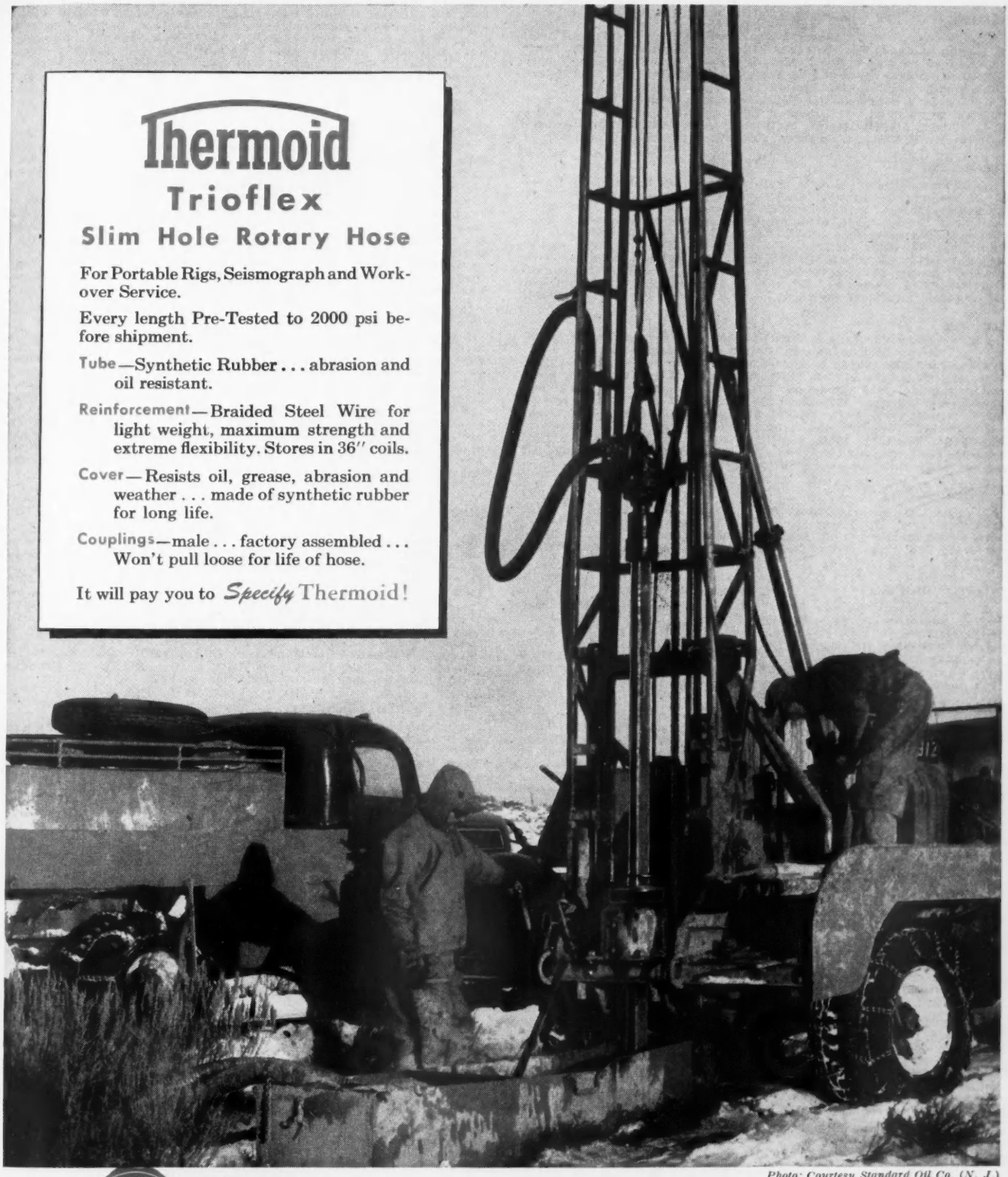

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BAMMEL

2 mi w Westfield. **Discovery Data:** Marland Oil Co. surveyed area by torsion balance. Humble again with torsion balance in 1928. Field by Hamil & Smith's Zappe 1, March 31, 1937. **Structure:** Deep dome, faulted. **Producing Formations:** Yegua 6180-6254, 6256-84 ft. **Production in 1949:** 72,537 bbls; through 1949: 2,579,257 bbls; daily, March 1, 1950: 218 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 34.5-56°. **Deepest Test:** Superior's Butler 1 at 10,574 ft in Wilcox. **Oil Outlet:** H. M. Harrell pipe line. **Principal Leaseholders:** H. M. Harrell, Superior, Geo. Lawrence, Hamil & Smith.

CLEAR LAKE

Ne of Friendswood, 5½ mi n Webster. **Discovery Data:** Structure by G. W. Somers Geophysical Corp. reflection seismograph for West Prod. Co. 1934-36. Stanolind worked area. Field by West's Fee 1 completed April 7, 1938. **Structure:** Deep seated faulted dome. **Producing Formations:** Frio 5505-25, 5682-5764, 5774-5846, 5828-5924 ft. **Production in 1949:** 766,336 bbls; through 10,995, 428 bbls; daily, March 1, 1950: 1,675 bbls. **Producing Wells, March 1, 1950:** 43 with no rigs running. **Gravity:** 26-31°. **Deepest Test:** Humble's Hutcheson 9, 11,740 ft in Vicksburg. **Oil Outlet:** Humble pipe line. **Principal Leaseholder:** Humble (purchased interest of West Prod. Co. in 1939).

CLINTON

2 mi ene Houston. Reels & Trobough Survey. **Discovery Data:** Structure by torsion balance and reflection seismograph, Stanolind 1933-34; Fohs Oil Co., 1934; Humble and Independent Exploration Co., 1935, and Texas Co, 1927-28. Field by Stanolind's Candelari 1, completed July 26, 1937. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 3207-3600, 3595-3620, 3735-87, 3800-35, 4020-52 ft, Cockfield 8000-48 ft. (Gas). **Production in 1949:** 44,843 bbls; through 1949: 6429,923 bbls; daily, March 1, 1950: 111 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 23-48°. **Deepest Test:** Stanolind's A. S. Moody 2 at 10,001 ft in Yegua. **Oil Outlet:** Stanolind pipe line. **Principal Leaseholder:** Stanolind.

CYPRESS (Gas)

2 mi sw Cypress. A. Roberts Survey. **Discovery Data:** Field by C. B. Hamill & L. M. Josey, Ind., H. J. Logenbaugh 1, completed in 1949. **Producing Formation:** Yegua 7024-36. **Production:** Shut in. **Deepest Test:** Discovery well at 7075 ft. **Principal Leaseholders:** Hamill & Josey.

DURKEE (Distillate)

2½ mi se North Houston field, 6 mi n of Houston. John E. Durkee Survey. **Discovery Data:** Field by Union Prod. Co.'s Homer J. Moore 1, completed Sept. 1947. **Producing Formations:** Yegua: 7177-83, 7705-10 ft. **Production in 1949:** 27,372 bbls; through 1949: 32,910 bbls; daily, March 1, 1950: 127 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 53.4°. **Deepest Test:** Discovery well at 8500 ft in Yegua. **Principal Leaseholder:** Union Prod. Co.

DURKEE, NORTH

On ne edge of North Houston field. WCRR Survey. **Discovery Data:** Structure by geophysics and subsurface geology. Field by Union Prod. Co.'s Nell S. Allen 1, recompleted Sept. 12, 1948. **Producing Formations:** Yegua 7082-7100 ft. **Production in 1949:** 62,956 bbls; through 1949: 75,986 bbls; daily, March 1, 1950: 223 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 35.6°. **Deepest Test:** Union Prod. Co.'s Langtry et al 1, at 7610 ft in Yegua. **Principal Leaseholder:** Union Prod. Co. **Remarks:** Discovery originally completed as a gasser in No. Houston fld. In 1948, it was reworked in a new oil sand and designated as discovery of Durkee, N. fld.

DYERSDALE (Mt. Houston)

1 mi sw Dyersdale, 7 mi ne Houston. **Discovery Data:** Structure by reflection seismograph. Field by Jack Frazier's E. Griffith 4, completed August 27, 1940. **Structure:** Faulted anticline. **Producing Formations:** Miocene 3475-98 ft, Frio 4060-6080 ft. **Production in 1949:** 1,389,915 bbls; through 1949: 7,092,454 bbls; daily, March 1, 1950: 4,714 bbls. **Producing Wells, March 1, 1950:** 96 with no rigs running. **Gravity:** 22°. **Deepest Test:** Jack Frazier's Carroll Wood et al 2 at 9206 ft in Cook Mountain. **Oil Outlet:** Stanolind pipe line. **Principal Leaseholders:** Lucerne Corp., Production Service, Tide Water.

ESPERSON, WEST (Distillate)

¾ mi w Esperson field (Liberty Co.). Meredith Duncan Survey. **Discovery Data:** Structure by flank drilling. Field by Atlas O&R Co. A. B. Cohn Est. 1, completed January, 1947. **Structure:** Dome. **Producing Formation:** Yegua 8670-98 ft. **Production in 1949:** 6,399 bbls; through 1949: 22,709 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 49.1°. **Deepest Test:** Atlas Cohn Est. 2, 9762 ft in Cook Mountain. **Oil Outlet:** Sun pipe line. **Pricipal Leaseholder:** Atlas O&R Co.

EUREKA HEIGHTS

Within Houston city limits. H. and J. Reinerman Surveys. **Discovery Data:** Structure by torsion balance, Humble, Dr. Sundt, reflection seismograph, Tide Water and others. Field by C. B. Bunte's Lackner 1 completed Nov. 22, 1934. **Structure:** Considered deep dome. **Producing Formation:** Yegua 7662-8095 (5 pays). **Production in 1949:** 317,585 bbls; through 1949: 5,821,243 bbls; daily, March 1, 1950: 620 bbls. **Producing Wells, March 1, 1950:** 14 with no rigs running. **Gravity:** 34-58°. **Deepest Test:** Jack Frazier's L. Lackner 1 at 9038 ft in Cook Mountain. **Oil Outlets:** Jack Frazier's 4-in to loading rack, Stanolind pipe line, Houston Nat. Gas Co. (Gas). **Principal Leaseholders:** Jack Frazier & McGehee Oil Co. **Remarks:** First commercial oil well was Jack Frazier's Vollmer & Neiman 1, completed March 23, 1938.

FAIRBANKS

3 mi ne Fairbanks, 12 mi nw Houston. **Discovery Data:** Structure by torsion balance, Humble, 1928. Reflection seismograph, 1933-34 by Amerada and Stanolind. Field by Amerada and Stanolind's Mills 1, completed Jan. 12, 1938. **Structure:** Anticline, faulted. **Producing Formations:** Yegua (Cockfield) 6464-69, 6505-20 ft, (U. Saline Bayou) 6743-7480 ft (7 pays). **Production in 1949:** 1,904,071 bbls; through 1949: 29,315,528 bbls; daily, March 1, 1950: 4760 bbls. **Producing Wells, March 1, 1950:** 270 with no rigs running. **Gravity:** 38-57°. **Deepest Test:** Stanolind's L. H. Caesar 1 at 8265 ft in Cook Mountain. **Oil Outlets:** Humble 4-in, Stanolind pipe line. **Principal Leaseholders:** Amerada, Stanolind, Johnson & Johnson, Windsor Oil Co., Gem Oil Co., Housh, Haynes B. Ownsby, Union Prod. Co. **Remarks:** Rosslyn is name given to wells producing from deep sands. Satsuma and Fairbanks are a part of the same structural unit with oil trapped in a pronounced nosing on the down-throw side of a fault. Warren Pet. operates gasoline plant in field and Firbanks Operators Committee oversees cooperative pressure maintenance.

GOOSE CREEK

Just south of Goose Creek adjoining Goose Creek Bay. **Discovery Data:** Structure by broken surface and gas seeps, paraffin dirt. Field by T. C. Rucker et al's Gaillard 2, completed in 1906. **Structure:** Deep seated salt dome. **Producing Formations:** Pliocene-Miocene 1000-3650 ft many sands averaging 40 ft thickness. Frio 4200-4400, 4475-4500 ft. **Production in 1949:** 1,757,826 bbls; through 1949: 82,817,069 bbls; daily, March 1, 1950: 6,206 bbls. **Producing Wells, March 1, 1950:** 181 with 4 rigs running. **Gravity:** 19-31°. **Deepest Test:** Humble's Simms 74 at 6975 ft in Jackson. **Oil Outlets:** Humble 8-in, 10 and 12-in, Gulf 6-in, Sun pipe line. **Principal Leaseholders:** Humble, Gulf, Grace Oil Co. **Remarks:** Production was small until 1916 when American Production Co. completed a 10,000 barrel well at 2030 ft.

HOCKLEY

5 mi s Hockley, 31 mi nw Houston. **Discovery Data:** Structure by surface indications soon after Spindletop discovery. Field by Texas Exploration Co.'s Warren 13 completed Oct. 15, 1923. **Structure:** Piercement type salt dome with flank production under salt overhang. **Producing Formations:** Miocene 1818-2090 ft, Frio 2096-2106, 3577-3640, 3673-80 ft, Jackson 5728-35, 6356-66 ft. **Production in 1949:** 112,675 bbls; through 1949: 251,794 bbls; daily, March 1, 1950: 245 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 24-33.4°. **Deepest Test:** 7754 ft in Yegua. **Oil Outlet:** Magnolia pipe line. **Principal Leaseholder:** Magnolia. **Remarks:** Production is on the west flank of this huge dome. Over 100 wells drilled on this structure before commercial production found. Each well must be treated as a wildcat. Magnolia opened present production in 1945.

HUMBLE

1 mi e of Humble, 18 mi n Houston. **Discovery Data:** Structure by surface indications, gas seeps, paraffin dirt. Field by D. R. Beatty's Fee 2 completed Jan. 9, 1905. **Structure:** Piercement type salt dome, cap rock 1000 ft, salt 1200 ft. **Producing Formations:** Caprock 580-1200 ft, Miocene 1350-2975 ft, Oligocene 3000-3990 ft, Jackson 4140-4900 ft, Yegua 5030-5819 ft. **Production in 1949:** 1,272,484 bbls; through 1949: 132,891,559 bbls; daily, March 1, 1950: 3,214 bbls. **Producing Wells, March 1, 1950:** 267 with no rigs running. **Gravity:** 17-45°. **Deepest Test:** Texas Co.'s Bender Est. 2 at 13,728 ft in Wilcox. **Oil Outlets:** Texas 10 and 8-in, Magnolia 8-in and Sun pipe lines. **Principal Leaseholders:** Texas, Sun, G. A. Martin, Wilson Oil Co., Traders Oil Co., Webb Oil Co., Arkansas Fuel Oil Co., M. L. Seitz. **Remarks:** Field is divided into Humble and Humble, light.

JOSEY RANCH (Distillate)

4 mi sw Cypress. H&TC Survey. **Discovery Data:** Structure by reflection seismograph. Field by L. M. Josey's Josey 1-A completed July 4, 1945. **Structure:** Stratigraphic trap. **Producing Formation:** Yegua 6955-65 ft. **Production in 1949:** 8,287 bbls; through 1949: 47,598 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 54°. **Deepest Test:** The Texas Co.'s L. M. Josey 1 at 7596 ft in base of Yegua. **Oil Outlets:** Truck. Gas by Tennessee Gas Trans. pipe line. **Principal Leaseholder:** L. M. Josey, Inc.

JOYCE RICHARDSON (Ogburn)

5½ mi w Satsuma 25 mi nw Houston. **Discovery Data:** Structure by torsion balance, Cranfill & Reynolds, 1929. Field by Joyce Richardson & Christian-Carpenter Drilling Co.'s Marks 1, completed June 26, 1940. **Structure:** Probable deep dome. **Producing Formations:** Cockfield 6441-56, 6550-60 ft, Yegua 6646-7147 ft (4 pays). **Production in 1949:** 68,153 bbls; through 1949: 1,017,631 bbls; daily March 1, 1950: 88 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 39-59°. **Deepest Test:** 7750 ft in Cook Mountain. **Oil Outlets:** Humble pipe line and trucks. **Principal Leaseholders:** General Crude, Federal O & G Industries. **Remarks:** Formerly called Ogburn and Harris.

KUHLMAN

1½ mi nw Spring Twst., Fred Limsky Survey. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Lamar Hunt Trust Est's E. L. Kuhlman 1, completed Aug. 8, 1948. **Producing Formation:** Cockfield 5875-82 ft. **Production in 1949:** 93,028 bbls; through 1949: 98,737 bbls; daily, March 1, 1950: 415 bbls. **Producing Wells, March 1, 1950:** 10 with no rigs running. **Gravity:** 38°. **Deepest Test:** Discovery well at 7314 ft in Yegua. **Oil Outlet:** Trucks. **Principal Leaseholders:** Christensen & Matthews, Lamar Hunt Tr. Est., Westbrook Oil Corp.

MYKAWA

1 mi s Mykawa. W. J. Lovett, W. B. Walker, F. J. Rothass, and John Randon, R. Cameron Surveys **Discovery Data:** Structure by gas in old wells and other surface indications; torsion balance of North American Exploration Co., in 1928. Field by Humble's Irwin 2, completed Aug. 19, 1929. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 1700-25, 4100-4189 ft, Marginulina 4380-90, 4445-4500 ft, Frio 4815-60, 4930-50 ft. **Production in 1949:** 71,433 bbls; through 1949: 5,230,681 bbls; daily, March 1, 1950: 120 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 26°. **Deepest Test:** Gulf's E. G. Siadous 1 at 10,550 ft in salt. **Oil Outlet:** Humble 8-in. **Principal Leaseholders:** Danciger, West Prod. **Remarks:** Includes Mykawa, Old and Mykawa, New.

NORTH DELHI (Distillate)

6 mi ne Katy, H&TC Survey. **Discovery Data:** Structure by reflection seismograph. Field by Josey-Bruton's D. Rorick 1, completed April 27, 1945. **Structure:** Fault. **Producing Formation:** Yegua 7040-69 ft. **Production in 1949:** 18,316 bbls; through 1949: 47,585 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 55°. **Deepest Test:** Sun & Cities Service's Martin Davis 1, 7608 ft in Yegua. **Oil Outlet:** Trucks. **Principal Leaseholders,** Humble, Sun, Josey-Bruton. **Remarks:** Also called New Delhi.

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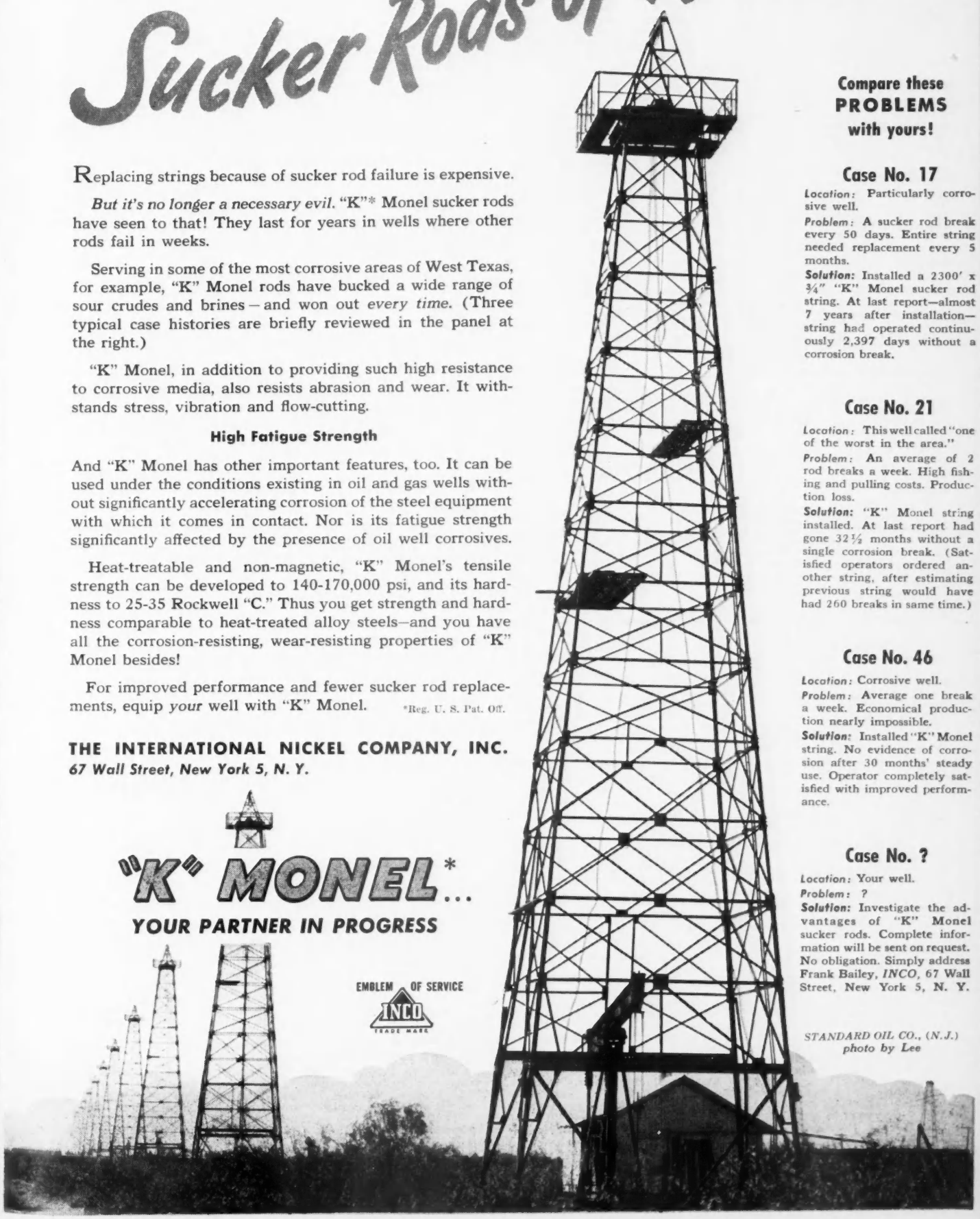

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STANDARD OIL CO., (N.J.) photo by Lee

NORTH HOUSTON

8 mi nw Houston near town of North Houston. **Discovery Data:** Structure by geophysics and subsurface geology. Field by Union Prod.'s Goodykuntz 1 completed Aug. 8, 1938. **Structure:** Faulting on anticline. **Producing Formations:** Yegua 6760-6825, 6840-45, 6900-53, 7000-20, 7020-30; 7170-90, 7480-7500 ft. **Production in 1949:** 108,179 bbls; through 1949: 791,306 bbls; daily, March 1, 1950: 220 bbls. **Producing Wells, March 1, 1950:** 8 with no rigs running. **Gravity:** 37-54°. **Deepest Test:** Union Prod. Co.'s Frick 1, 7640 ft in Yegua. **Oil Outlets:** Stanolind pipe line, United Gas (gas). **Principal Leaseholders:** Union Producing, Kirby Pet. Co. **Remarks:** The discovery well first classed as extension to Fairbanks field. After study it proved to be different structure and well and area given name of North Houston. Production data does not include recycling plant products.

PIERCE JUNCTION

4 mi s Houston near Pierce Junction townsite. **Discovery Data:** Structure by surface elevation, gas seeps, and paraffin dirt. Field by Gulf Oil Corp's Taylor 2, completed Feb. 19, 1921. **Structure:** Piercement type salt dome. Cap rock 700 ft, salt 950 ft. **Principal Formations:** Miocene 3200-3670 ft (4 pays), Oligocene 3740-4490 ft (5 pays), Frio 4515-4890 ft (3 pays), Vicksburg 5550-6950 ft (3 pays), Jackson 7358-7570 ft (2 pays). **Production in 1949:** 1,285,379 bbls; through 1949: 39,992,523 bbls; daily, March 1, 1950: 3,748 bbls. **Producing Wells, March 1, 1950:** 93 with 2 rigs running. **Gravity:** 21-35°. **Deepest Test:** McCarthy & Gulf's Mowery 1 at 12,940 ft in salt. **Oil Outlets:** Humble 6-in, Shell 10-in, Gulf 6-in & Sinclair pipe lines. **Principal Leaseholders:** Gulf, D. D. Feldman, R. E. Smith, Sunray, McCarthy O & G, Production Service.

RANKIN

3½ mi sw Huffman, F. H. Rankin Survey. **Discovery Data:** Structure by reflection seismograph. Field by Sun Oil Co.'s Ruby Bossier 1, completed April 1, 1948. **Producing Formation:** Yegua 8252-57 ft. **Production in 1949:** 2525 bbls; through 1949: 6987 bbls; daily, March 1, 1950: 6 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 38.8°. **Deepest Test:** Discovery well at 9015 ft in Yegua. **Oil Outlet:** Trucks. **Principal Leaseholder:** Sun Oil Co.

SAN JACINTO (Distillate)

3½ mi e Humble field, in J. W. Singleton, John Hams Surveys. **Discovery Data:** Structure by subsurface geology. Field by Houston Oil Co.'s Eugene L. Bender Est 1, completed May 12, 1947. **Producing Formations:** Yegua: 7780-8520 ft (4 pays). **Production in 1949:** 123,155 bbls; through 1949: 150,129 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 50-60°. **Deepest Test:** Discovery well at 8600 ft in Yegua. **Oil Outlet:** Trucks. **Principal Leaseholder:** Houston Oil Co. **Remarks:** Once called Humble East.

SATSUMA

12 mi sw Houston, 2½ mi sw Fairbanks field. Francis Fry & WCRR No. 2 Surveys. **Discovery Data:** Structure by torsion balance, Amerada and Stanolind 1934-35. Humble in 1928. Field by Amerada-Stanolind's Dopslauf 1-C, completed June 5, 1936. **Structure:** Closure on down throw side of fault. **Producing Formations:** Yegua 6798-6862 ft, Cook Mountain 7260-82 ft. **Production in 1949:** 226,271 bbls; through 1949: 2,328,794 bbls; daily, March 1, 1950: 557 bbls. **Producing Wells March 1, 1950:** 15 with no rigs running. **Gravity:** 38-53°. **Deepest Test:** Amerada-Stanolind's Dopslauf 1-A at 8050 ft in Cook Mountain. **Oil Outlets:** Stanolind, Humble, & United Gas pipe lines. **Principal Leaseholders:** Amerada, Stanolind, H. E. Williams et al.

SOUTH HOUSTON

Surrounding town of South Houston, H&TB 5, Mary Nichols, South Houston Garden Subdivision 6 and 7, Callahan and Vance Surveys. **Discovery Data:** Structure by reflection seismograph, torsion balance, Stanolind 1934. Field by Stanolind's Fee 1, completed June 29, 1935. **Structure:** Deep seated salt dome, salt 4662 ft. **Producing Formations:** Miocene 3760-4100 ft, Marginulina & Frio 4500-4900 ft. **Production in 1949:** 1,410,359 bbls; through 1949: 18,874,103 bbls; daily, March 1, 1950: 3,278 bbls. **Producing Wells, March 1, 1950:** 64 with no rigs running. **Gravity:** 19-32°. **Deepest Test:** Stanolind's Staiti 1 at 9470 ft in Yegua. **Oil Outlet:** Pan-American 6-in. **Principal Leaseholders:** Stanolind, R. A. Irwin, R. W. O'Meara Tr., Dick Schwab.

SPRING

½ mi s Spring townsite. M. C. Bulrice & Wiley Smith Surveys. **Discovery Data:** Structure by geophysics and subsurface geology. Field by Eltex Ltd.'s Bender Estate 1, completed Sept. 17, 1944. **Structure:** Believed lensing out of sands. **Producing Formation:** Yegua 6237-49 ft. **Production in 1949:** 44,281 bbls; through 1949: 348,561 bbls; daily, March 1, 1950: 93 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 38°. **Deepest Test:** Howard C. Meyer's T. R. Wunsche Hrs. et al 1 at 6525 ft in Cockfield. **Oil Outlet:** Stanolind pipe line. **Principal Leaseholder:** Oil Drlg., Inc.

TOMBALL

Surrounds town of Tomball. **Discovery Data:** Structure by surface and subsurface geology; torsion balance, Vacuum Oil Co., 1929; also geophysics by others, 1933. Field by Magnolia and Humble's Kobs 1, completed May 27, 1933. **Structure:** Regarded deep dome, as other structures along the Raccoon Bend-Conroe trend; closely resembles Conroe. Circular in shape; 800 ft structural uplift; 350 ft total closure; 250 ft productive closure, and oil in about 25 ft of the productive closure. Several faults, averaging 150 ft displacement, cut across structure ne-sw. **Producing Formations:** Cockfield 5330-5630 ft, Yegua 6150-60 ft. **Production in 1949:** 2,391,989 bbls; through 1949: 46,609,423 bbls; daily, March 1, 1950: 5,460 bbls. **Producing Wells, March 1, 1950:** 402 with no rigs running. **Gravity:** 41-52°. **Deepest Test:** Humble's Milo 10, 15,452 ft in Wilcox. **Oil Outlets:** Humble 8-in, Magnolia 6-in, Humble 10-in gas line to Houston, Baytown, Port Arthur and Port Neches. **Principal Leaseholders:** Amerada, Humble, Shell, Sun, Texas Co.

WEBSTER (Friendswood)

Common corner of Brazoria, Galveston and Harris counties in the Perry & Austin, Thomas Choate, W. K. Smith, L. Hemenway, A. Whitlock, W. D. C. Hall Surveys. **Discovery Data:** Structure by subsurface geology, reflection seismograph, torsion balance, and gravitometer, Humble and West Production Co., 1933. G. W. Somers was first to shoot entire structure. Field by Humble's Settegast 1, completed July 10, 1937. **Structure:** Deep-seated dome with faulting. **Producing Formation:** Marginulina 5090-5110 ft, Frio 5415-27, 5480-5580, 5670-6080 ft. **Production in 1949:** 13,155,901 bbls; through 1949: 149,014,224 bbls; daily, March 1, 1950: 29,573 bbls. **Producing Wells, March 1, 1950:** 211 with no rigs running. **Gravity:** 30°. **Deepest Test:** 8452 ft in Frio. **Oil Outlet:** Humble 8-in. **Principal Leaseholder:** Humble. **Remarks:** Also known as Friendswood.

JASPER COUNTY

BUNA

3½ mi w Bessmay. Wm. Weiss Survey. **Discovery Well:** Placid Oil Co.'s J. S. Richardson Hrs. 1, completed Nov. 4, 1948. **Producing Formation:** Yegua 7458-82 ft. **Production in 1949:** 9,488 bbls; through 1949: 14,049 bbls; daily, March 1, 1950: none reported. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 45°. **Deepest Test:** Discovery well at 8350 ft in Yegua. **Oil Outlet:** Magnolia pipe line. **Principal Leaseholder:** Placid Oil Co.

ROCKLAND (Abandoned)

2 mi ne of Rockland. B. Addison, P. Smith Surveys. **Discovery Data:** Structure by surface indications. Drilling began in 1902. Field by Rio Neches Oil Co.'s Boykin 1, completed in 1928. **Structure:** Fault. **Producing Formations:** Sands around 1275 ft, considered base of Jackson or top of Yegua. Average sand thickness 6 ft. **Production:** Produced 43,700 bbls before abandoned. **Gravity:** 22°. **Deepest Test:** 10,365 ft in Cretaceous. **Principal Leaseholder:** Midwest Oil Co. **Remarks:** Abandoned the second time in 1944.

JEFFERSON COUNTY

AMELIA

2½ mi w Beaumont, C. Williams & A. Savery Surveys. **Discovery Data:** Structure by Humble's torsion balance and reflection seismograph in 1934. Magnolia torsion balance, 1935. Reflection seismograph, Sun, Stanolind, 1935. Field by Humble's Langham 1, completed Feb. 12, 1936. **Structure:** Deep seated dome. **Producing Formations:** Marginulina 6315-30 ft, Frio 6765-7125 ft. **Production in 1949:** 1,078,190 bbls; through 1949: 17,684,054 bbls; daily, March 1, 1950: 1,558 bbls. **Producing Wells, March 1, 1950:** 88 with no rigs running. **Gravity:** 29°. **Deepest Test:** Humble's Peveto at 8738 ft in Vicksburg. **Oil Outlet:** Humble 6-in. **Principal Leaseholder:** Humble.

BIG HILL (Abandoned)

8 mi se Hampshire, S. Eaton, ELRR 373, J. L. Dyson, D. D. Dyson and Wm. McFaddin Surveys. **Discovery Data:** Structure by surface indications of 30 ft high and sulphur gas. **Discovery Well:** Houston Oil Co.'s Pipkin-Davis 3 completed March 29, 1923. **Structure:** Piercement type salt dome, cap rock 200 ft (known since 1901). **Producing Formation:** Basal Miocene 4980-86 ft. **Production in 1949:** 2,714 bbls; through 1949: 17,841 bbls; daily, March 1, 1950: 76 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 20-42°. **Deepest Test:** 10,187 ft in Frio. **Principal Leaseholders:** Texas Co., Houston, Stanolind, Gulf. **Remarks:** Area abandoned in 1924 after producing 14,000 bbls. Rediscovered Dec. 17, 1941, by Stanolind Oil & Gas Co.'s Anderson 1 as gas well from Frio at 8705-21 ft. This well abandoned in Spring of 1946. Again reopened by The Bering Co. in Nov. 1949.

BIG HILL, NORTH (Distillate)

4 mi w LaBelle field. T&NO Survey. **Discovery Data:** Field by McCarthy O&G Corp.'s Rev. C. E. Byrne 1, completed July 23, 1949. **Producing Formation:** 8108-24 ft. **Production in 1949:** 1,173 bbls. through 1949: 1,173 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Deepest Test:** Discovery well at 10,536 ft. **Principal Leaseholder:** McCarthy.

CLAM LAKE

12 mi w Sabine, centering around S. A. Pace Survey. **Discovery Data:** Structure by reflection seismograph, Shell, 1937, Humble also showed prospect favorably by torsion balance and refraction seismograph in 1930. Field by Shell's McFaddin 1, completed Dec. 27, 1937. **Structure:** Deep seated salt dome, salt reached 8198 ft. **Producing Formations:** Pliocene 2345-2400 ft, Oakville 3820-4000 ft, Catahoula 5846-6660 ft. **Production in 1949:** 195,503 bbls; through 1949: 2,312,754 bbls; daily, March 1, 1950: 538 bbls. **Producing Wells, March 1, 1950:** 15 with no rigs running. **Gravity:** 20-40°. **Deepest Test:** Shell-Humble's McFaddin 2, 8198 ft in salt. **Oil Outlet:** Barge to Sun pipe line. **Principal Leaseholder:** Shell.

FANNETT

2½ mi s Fannett. J. Blackman, M. Bowes, I. Proborth, W. H. Smith & D. Burrell Surveys. **Discovery Data:** Structure by refraction seismograph, Gulf, 1925. Field by Gulf's Bordages A-2 completed Jan. 20, 1927. **Structure:** Piercement type salt dome, cap rock 870 ft, salt 2200 ft. **Producing Formations:** Miocene 2900-4300 ft (4 pays), Oligocene 4850-5000 ft, Frio 5570-11,050 ft (14 pays). **Production in 1949:** 1,522,318 bbls; through 1949: 19,284,893 bbls; daily, March 1, 1950: 3,621 bbls. **Producing Wells, March 1, 1950:** 67 with 3 rigs running. **Gravity:** 23-54°. **Deepest Test:** Gulf's R. S. Jackson 3-A at 13,503 ft in Hackberry. **Oil Outlet:** Gulf 6-in. **Principal Leaseholders:** Gulf, McCarthy O&G Corp. **Remarks:** Includes Fannett, East (abandoned) field.

GILBERT RANCH (Distillate)

3 mi nw Fannett. J. Ricord & S. Miles Surveys. **Discovery Data:** Structure by magnetometer and torsion balance in 1936. Drilling based on surface indications. Field by Sun's Gilbert 1, completed May 29, 1945. **Structure:** Fault. **Producing Formations:** Frio 8675-90, 8727-42 ft. **Production in 1949:** 60,146 bbls; through 1949: 127,913 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 53-59°. **Deepest Test:** Sun's Nona Mills Co. 1, at 9904 ft in Hackberry. **Oil Outlets:** Distillate trucked out. United Gas takes gas. **Principal Leaseholders:** Sun, Meredith-Clegg-Hunt.

HILDEBRANDT BAYOU

1¼ mi s Lovells Lake field. James McNabb Survey. **Discovery Data:** Structure by seismograph. Field by James F. Morse & Co.'s Wallace

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Talbot 1, completed June 28, 1948. **Structure:** Deep seated dome. **Producing Formation:** Marginulina 7759-61 ft. **Production in 1949:** 45,331 bbls. through 1949: 62,593 bbls; daily, March 1, 1950: 134 bbls. **Producing Wells, March 1, 1950:** 3 with 1 rig running. **Gravity:** 39.4°. **Deepest Test:** Discovery well at 9508 ft in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholders:** James F. Morse & Co. and Sun.

HILDEBRANDT BAYOU, SOUTH (Distillate)
B. Blackman Survey, Lot 5. **Discovery Data:** Field by H. B. Herbert, C. B. Claypool, J. C. Means, Jr.'s R. Burrel Hrs. 1, completed April 21, 1949. **Structures:** Deep seated dome. **Producing Formations:** Frio 8438-44, 8453-58 ft. **Production in 1949:** 6,846 bbls; through 1949: 6,846 bbls; daily, March 1, 1950: 75 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 42.4-64.5°. **Deepest Test:** Discovery well at 8,761 ft in Frio. **Oil Outlet:** Humble pipe line. **Principal Leaseholders:** H. B. Herbert, C. B. Claypool, J. C. Means, Jr., and Sun. **Remarks:** Sun discovered crude in this field Oct., 1949.

LA BELLE
7½ mi e Hampshire, 11 mi w Port Arthur. **Discovery Data:** Structure by torsion balance, Vacuum Oil Co., 1929. Checked negative by seismograph after test was drilled. Later geophysical work done by Sun. Field by Sun Oil Co.'s Broussard 2, completed Jan. 13, 1937. **Structure:** Deep dome. **Producing Formations:** Miocene 6527-7470 ft, Marginulina 8205-45 ft, Frio 8622-40 ft. **Production in 1949:** 393,321 bbls; through 1949: 3,488,424 bbls; daily, March 1, 1950: 888 bbls. **Producing Wells, March 1, 1950:** 14 with no rigs running. **Gravity:** 40-51°. **Deepest Test:** Sun's Broussard & Hebert 19 at 10,326 ft in Frio. **Oil Outlet:** Sun pipe line. **Principal Leaseholder:** Sun.

LOVELLS LAKE
Sw of Spindletop, centering C. Hillebrandt Survey. **Discovery Data:** Structure by torsion balance, H. C. Cockburn in 1929. From 1933 to 1938 reflection and torsion balance by Humble. Field by McCarthy's Broussard 1, completed Jan. 10, 1938. **Structure:** Deep seated, faulted dome. **Producing Formations:** Marginulina 7295-7325 ft, Frio 7700-15, 7790-7810, 7912-29, 9030-40 ft. **Production in 1949:** 1,075,531 bbls; through 1949: 15,656,136 bbls; daily, March 1, 1950: 2,540 bbls. **Producing Wells, March 1, 1950:** 99 with no rigs running. **Gravity:** 38-52°. **Deepest Test:** Humble's Jefferson Ld. 40, 9855 ft in Vicksburg. **Oil Outlet:** Humble pipe line. **Principal Leaseholders:** Humble, Shell, Stanolind, Phillips.

LOVELLS LAKE, NORTH
10 mi sw Beaumont. S. Corzine, C. Hillebrandt & M. Pevitot Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Humble's Jefferson Land Co. C-1, completed Nov. 11, 1944. **Structure:** Deep seated salt dome, faulted. **Producing Formations:** Frio 7120-25, 7175-85 ft. **Production in 1949:** 51,066 bbls; through 1949: 362,932 bbls; daily, March 1, 1950: 113 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 29°. **Deepest Test:** Discovery well at 9963 ft in Vicksburg. **Oil Outlet:** Humble pipe line. **Principal Leaseholder:** Humble.

NOME
3 mi se Nome, centering W. H. Aldrige, M. Pevito, J. Blair, T&NO 32, and J. W. Kirby Surveys. **Discovery Data:** Structure by surface indications, torsion balance, Sun, 1932. Torsion balance and reflection seismograph, shell, 1934-35. Field by Shell's Carpenter 1, completed July 19, 1946. **Structure:** Deep dome. **Producing Formations:** Miocene 4410-4725 ft, Marginulina 6000-50 ft. **Production in 1949:** 123,006 bbls; through 1949: 5,255,167 bbls; daily, March 1, 1950: 316 bbls. **Producing Wells, March 1, 1950:** 28 with no rigs running. **Gravity:** 28°. **Deepest Test:** Shell & Sun's H. Long 1 at 9045 ft in Vicksburg. **Oil Outlet:** Sun 6-in. **Principal Leaseholders:** Shell, Sun.

NORTH CHEEK (Distillate)
Location: 1 mi w Brooks, S. Stivers Survey. **Discovery Data:** Structure by torsion balance in 1929. Field by Magnolia's Phelan 1, Completed June 27, 1937. **Structure:** Deep seated dome. **Producing Formations:** Frio 8180-8680 ft. **Production in 1950:** 14,365 bbls; through 1949: 130,412 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 44-61°. **Deepest Test:** Magnolia's Phelan 3 at 9007 ft in Oligocene. **Oil Outlets:** Trucks. **Phincipal Leaseholder:** Magnolia. **Remarks:** No crude produced since 1939.

SABINE PASS (Abandoned)
6 mi w Sabine Pass about 9000 ft offshore in Gulf of Mexico, State Tracts 70 & 71. **Discovery Data:** Structure by reflection seismograph and torsion balance. Field by British-American Oil Producing Co.'s State-Gulf 1-B-71, completed March 30, 1941. **Structure:** Dome. **Producing Formations:** Miocene 4982-92 ft. **Production Total:** 10,218 bbls. **Gravity** 26°. **Deepest Test:** Humble's Baird 1 at 8015 ft in Oligocene. **Principal Leaseholders:** British-American Oil Prod. Co., Hall-Jordon Oil Co., Humble. **Remarks:** First field in Gulf off Texas Coast. Abandoned in March, 1942 after producing 10,218 bbls.

SOUTH CHINA
2 mi w Cheek. **Discovery Data:** Structure by reflection seismograph, Sun, 1935. Field by Geo. Echols and Herbert & Smith's Fontenot 1, completed June 23, 1939. **Structure:** Deep dome. **Producing Formations:** Frio 7490-7540, 7802-10, 7883-53, 7860-7933 ft. **Production in 1949:** 137,837 bbls; through 1949: 2,009,791 bbls; daily, March 1, 1950: 324 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 39-56°. **Deepest Test:** 8879 ft in Jackson. **Oil Outlet:** Sun pipe line. **Principal Leaseholders:** Pan American Prod. Co., Floyd L. Karsten.

SPINDLETOP
2 mi s Beaumont, Jno. Veatch, P. Humphrey, J. Douthit Surveys. **Discovery Data:** Structure by elevation, gas, mineral waters. Field by J. F. Lucas' Gladys 1, completed Jan. 10, 1901. **Structure:** Piercement type salt dome, cap rock 700 ft, salt 1200 ft. **Producing Formations:** Cap rock and Miocene 800-1200 ft; Miocene 2500-3500 ft; Middle Oligocene and Frio 4000-5879 ft. Average sand thickness 70 ft. **Production in 1949:** 494,325 bbls; through 1949: 130,795,907 bbls; daily March 1, 1950: 1,247 bbls. **Producing Wells, March 1, 1950:** 156 with no rigs running. **Gravity:** 22-31°. **Deepest Test:** Sun's McFaddin Tr et al 2 at 8500 ft in Vicksburg. **Oil Outlets:** Gulf & Sun pipe lines. **Principal Leaseholders:** Phelp Bros., Stanolind, Stella Oil, Unity Oil, Wilson Broach Co. **Remarks:** First major oil field discovered on Texas Gulf Coast.

STOWELL—WINNIE
2½ mi e Stowell townsite. **Discovery Data:** Structure by reflection seismograph. Field by Glenn H. McCarthy et al's Crawford 1, completed Dec. 10, 1941. **Structure:** Fault. **Producing Formations:** Frio (Stowell) 7355-9000 ft Marginulina (Winnie) 7500-8480 ft. Frio 8640-10,800 ft. **Production in 1949:** 2,728,688 bbls; through 1949: 29,439,201 bbls; daily, March 1, 1950: 6,000 bbls. **Producing Wells, March 1, 1950:** 92 with no rigs running. **Gravity:** 33-61°. **Deepest Test:** McCarthy's Hankamer 4, 12,505 ft in Frio. **Oil Outlets:** Gulf pipe line. **Principal Leaseholders:** Crown Central, Gulf, McCarthy, Phillips, Sun, The Texas Co. **Remarks:** Sometimes referred to as Winnie and Hampshire.

WEST BEAUMONT
2 mi n Amelia, 2 mi w Beaumont. H. Williams and H. Houston Surveys. **Discovery Data:** Structure by reflection seismograph in spring of 1933 by McCollum Exp. Co. The block was turned to Stanolind by Yount-Lee Oil Co. Stanolind worked in the area, as did Glenn McCarthy. Field by McCarthy's Longe 1 completed March 20, 1936. **Structure:** Deep seated, faulted dome. **Producing Formations:** Catahoula 4555-75, 4650-65 ft, Discorbis 5360-80 ft, Heterostegina 5600-15 ft, Marginulina 5880-90, 5995-6010, Frio 6085-6105 ft. **Production in 1949:** 526,073 bbls; through 1949: 8,691,819 bbls; daily, March 1, 1950: 1,337 bbls. **Producing Wells, March 1, 1950:** 47 with no rigs running. **Gravity:** 27-29°. **Deepest Test:** The Texas Co's Yount 1 at 8501 ft in Vicksburg. **Oil Outlets:** Sun 4-in, Humble. **Principal Leaseholders:** Stanolind, McCarthy, The Texas Co. **Remarks:** Was originally considered part of Amelia field.

WOOD (Distillate)
2½ mi n of Stowell field, T&NO Survey. **Discovery Data:** Structure by reflection seismograph. Field by McCarthy O&G Corp. Mrs. R. H. Wood et vir 1, completed Feb. 6, 1948. **Producing Formations:** Hackberry 10,446-54 ft. **Production:** Shut in. **Producing Wells, March 1, 1950:** 1 (shut in). **Gravity:** 56°. **Deepest Test:** Discovery well at 11,228 ft. in Hackberry. **Principal Leaseholder:** McCarthy O&G Corp.

LEE COUNTY

TANGLEWOOD
2 mi se Tanglewood. B. Smith, J. Fulcher, D. Hudson Survey. **Discovery Data:** Structure by surface & subsurface geology & seismic survey. Field by Humble's G. Vick et al 2, completed April 27, 1948. **Structure:** Fault. **Producing Formation:** Edwards 6300-40 ft. **Production in 1949:** 2,243 bbls; through 1949: 5,846 bbls; daily, March 1, 1950: 2 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 31-35°. **Deepest Test:** Humble's Geo. D. Vick et al 1 at 8855 ft. **Oil Outlet:** Trucks. **Principal Leaseholder:** Humble O&R Co.

LIBERTY COUNTY

CLEVELAND
4 mi se Cleveland. John Pleasants, C. Smith, T. Devers Surveys. **Discovery Data:** Structure by surface indications, Humble, torsion balance, 1931; Gulf geophysical work. Field by Gulf's Kirby Lbr. Co. C-1, completed Dec. 29, 1933. **Structure:** Deep dome, faulted. **Producing Formations:** Yegua 5672-75, 5687-92, 5716-24, 5820-87 ft, Wilcox 9050-9150 ft. **Production in 1949:** 103,297 bbls; through 1949: 2,450,263 bbls; daily, March 1, 1950: 147 bbls. **Producing Wells, March 1, 1950:** 11 with no rigs running. **Gravity:** 38-60°. **Deepest Test:** Gulf's Kirby Lumber 22-C, 12,523 ft in Wilcox. **Oil Outlets:** Magnolia 3 and 8-in. **Principal Leaseholders:** Gulf & Floyd L. Karsten.

CLEVELAND, NORTH (Grogan)
1 mi n Cleveland field. **Discovery Data:** Surface geology. Field by Shell's Grogan Mfg. 1, completed Feb. 12, 1945. **Structure:** Fault. **Producing Formation:** Yegua 5760-90 ft. **Production in 1949:** 378,000 bbls; through 1949: 980,829 bbls; daily, March 1, 1950: 698 bbls. **Producing Wells, March 1, 1950:** 26 with no rigs running. **Gravity:** 40-49°. **Deepest Test:** Discovery well at 12,250 ft in Wilcox. **Oil Outlet:** Magnolia pipe line. **Principal Leaseholders:** Texana, Miles Prod. Co., J. C. Hawkins, Floyd L. Karsten.

COTTONWOOD
7 mi se Devers. **Discovery Data:** Structure by reflection seismograph Field by Wm. Helis' Hirsch Est. 1, completed Oct. 20, 1943. **Structure:** Folding, faulting and lensing sands. **Producing Formations:** Frio 7695-7755 ft. **Production in 1949:** 116,525 bbls; through 1949: 333,852 bbls; daily, March 1, 1950: 304 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 26.3°. **Deepest Test:** Wm. Helis' Willis 1, 8404 ft in Frio. **Oil Outlet:** Sun pipe line. **Principal Leaseholder:** Wm. Helis.

COTTONWOOD, NORTH (Distillate)
2 mi n Cottonwood field. T&NO Survey. **Discovery Data:** Structure by subsurface geology. Field by Wm. Hebert Hunt Tr. Est's Welch & Sliva 1, completed Aug. 25, 1948. **Structure:** Dome. **Producing Formation:** Frio 7908-26 ft. **Production in 1949:** 328 bbls; through 1949: 1,904 bbls. Producing Wells, March 1, 1950: 1 (shut in) with no rigs running. **Gravity:** 58°. **Deepest Test:** Discovery well at 8296 ft in Frio. **Oil Outlet:** Trucks. **Principal Leaseholder:** Hunt Oil Co.

ESPERSON DOME (Including South)
6 mi sw Dayton. **Discovery Data:** Structure by torsion balance, Union Exploration Co., 1928. Field by H. B. Smith's Moores Bluff 1, completed Aug. 15, 1929. **Structure:** Salt dome, salt 7055 ft. **Producing Formations:** Lagarto-Oakville, Anahuac, Frio, Vicksburg, Jackson, Yegua, 2200-9180 ft. **Production in 1949:** 1,227,414 bbls; through 1949: 17,213,772 bbls; daily, March 1, 1950: 3,630 bbls. **Producing Wells, March 1, 1950:** 97 with no rigs running. **Gravity:** 21-60°. **Deepest Test:** Atlantic's Davis Est. 1 at 10,505 ft in Cook Mountain. **Oil Outlet:** Sun 6-in. **Principal Leaseholders:** General Crude Oil Co., W. P. Luse. **Remarks:** Includes Esperson, South field.

HANKAMER
7½ mi s Devers. L. Barrow, G. Strangler, A. Allen, A. Weaver, and H&TC 21 and 22 Surveys. **Discovery Data:** Structure by surface indications and mineral waters. Torsion balance, Gulf, 1926-28. Field by Gulf's Boyt 1, completed June 6, 1929. **Structure:** Salt dome, salt

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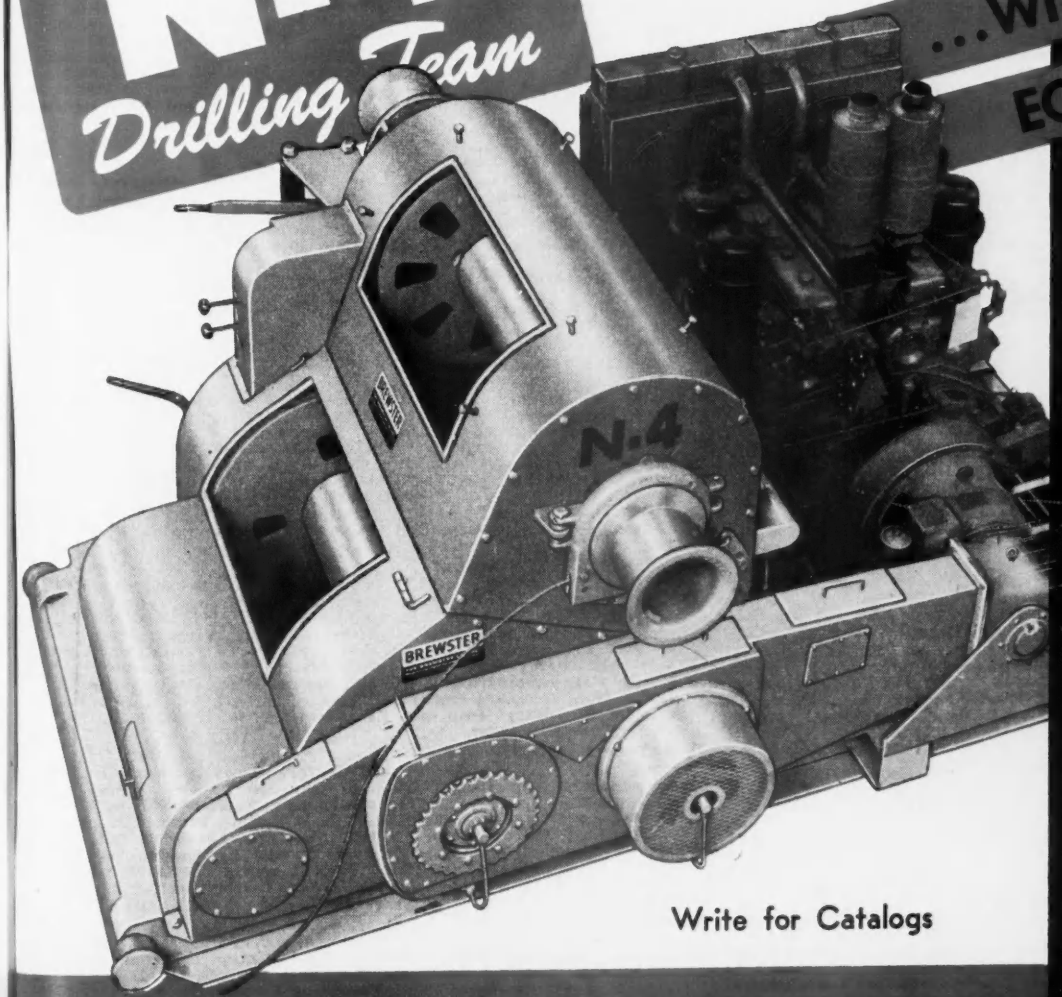

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7582 ft. **Producing Formations:** Miocene 2580-4900 ft, Frio 5070-7120 ft, Vicksburg 8485-8505 ft. **Production in 1949:** 345,230 bbls; through 1949: 8,441,675 bbls; daily, March 1, 1950, 1,247 bbls. **Producing Wells, March 1, 1950:** 70 with no rigs running. **Gravity:** 37-55°. **Deepest Test:** Gulf's J. T. Hooks 1, 13,010 ft in Yegua. **Oil Outlet:** Gulf 8-in. **Principal Leaseholders:** Gulf, Wilson-Broach Oil Co., R. Olsen. **Remarks:** Name Hankamer-New given to deeper sand found in Sept. 1935.

HARDIN

3 mi n Hardin. J. Robeson, H. B. Johnston, A. B. Hardin Surveys. **Discovery Data:** Structure by surface geology; Jack Frazier torsion balance and reflection seismograph; Gulf worked with pendulum. Field by Jack Frazier et al's Lynott & Buffum 2, completed July 23, 1935. **Structure:** Deep dome, faulted. **Producing Formations:** Yegua 7500-7775 ft (8 pays). **Production in 1949:** 346,299 bbls; through 1949: 14,883,919 bbls; daily, March 1, 1950: 718 bbls. **Producing Wells, March 1, 1950:** 70 with no rigs running. **Gravity:** 37-55°. **Deepest Test:** Humble's A. B. Finley 1 at 11,663 ft. **Oil Outlets:** Magnolia 4-in, Sun 6-in pipe lines. **Principal Leaseholders:** Humble, Gulf, Atlantic, Magnolia, Texas Co., Woodley, Pan American, Arkansas Fuel Oil Co. **Remarks:** Field has been known as Moss Hill and Big Dome.

HULL

½ mi s Hull townsite. J. Devore, S. Wickliff, I&GN 27 and 28, and C. Underton Surveys. **Discovery Data:** Structure by surface indications of elevation, gas seeps. Field by Republic Production Co.'s Dolbear 3, completed July 26, 1918. **Structure:** Piercement type salt dome, cap rock 350 ft, salt 700 ft. **Producing Formations:** Caprock 400-850 ft, Miocene-Oligocene 1075-3875 ft, Jackson 3940-4900 ft, Yegua 4860-7860 ft. **Production in 1949:** 1,773,548 bbls; through 1949: 103,543,249 bbls; daily, March 1, 1950: 6365 bbls. **Producing Wells, March 1, 1950:** 205 with 5 rigs running. **Gravity:** 16-45°. **Deepest Test:** Gulf's Phoenix Dev. Co. 15, at 9669 ft in salt. **Oil Outlets:** Humble 6-in, American 6-in, Sun 4-in, Gulf 6-in. **Principal Leaseholders:** Gulf, American Republics, Texas Co., John W. Mecom, Houston Prod. Co., Humble, Sun, Stanolind, Cities Service.

KIRBY

7 mi sw Dayton on sw flank of Esperson dome. **Discovery Data:** Structure by subsurface geology. Field by General Crude's Welch B-3, completed March 10, 1943. **Structure:** Fault. **Producing Formations:** Miocene 3475-85 ft, Frio 5188-95 ft, Jackson 5960-6325 ft, Yegua 6575-8440 ft. **Production in 1949:** 234,984 bbls; through 1949: 1,485,409 bbls; daily, March 1, 1950: 515 bbls. **Producing Wells, March 1, 1950:** 18 with no rigs running. **Gravity:** 37-42°. **Deepest Test:** General Crude's Welch 18-B at 10,554 ft. **Oil Outlet:** Sun Pipe Line. **Principal Leaseholder:** General Crude. **Remarks:** Separated from Esperson Dome field by faulting.

MARTHA

5½ mi nw Liberty near Martha townsite, I&GN Survey, 7. **Discovery Data:** Structure by reflection seismograph. Stanolind, 1935-1936. Field by Stanolind's Flowers 1, completed July 6, 1939. **Structure:** Deep dome. **Producing Formations:** Yegua 8090-8110, 8140-60, 8180-8222 ft. **Production in 1949:** 83,840 bbls; through 1949: 1,441,796 bbls; daily, March 1, 1950: 167 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 38-41°. **Deepest Test:** Stanolind's Garrow 1 at 9820 ft in Cook Mountain. **Oil Outlet:** Stanolind pipe line. **Principal Leaseholder:** Stanolind.

McCOY

6 mi e Cleveland. James McCoy, Daniel Donahoe Surveys. **Discovery Data:** Structure by reflection seimograph. Field by Ohio Oil Co.'s Kirby Lbr. Corp. 1, completed March 5, 1946. **Structure:** Deep seated dome, faulted. **Producing Formations:** Wilcox 9024-9100, 9108-12, 9125-35 ft. **Production in 1949:** 331,175 bbls; through 1949: 1,037,761 bbls; daily, March 1, 1950: 650 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 32-54°. **Deepest Test:** Floyd L. Karsten's Quinn 5-A at 10,344 ft in Wilcox. **Oil Outlets:** Shell and Tenn. Gas Trans. (Gas) pipe lines. **Principal Leaseholders:** Floyd L. Karsten, Miles Prod. Co., Shell Oil Co., Ohio Oil Co., Sun, Gulf. **Remarks:** Originally called Cleveland, East field.

MOSS BLUFF (Abandoned)

10 mi se Liberty. B. M. Spinks, R. O. W. McManus, J. Barry, N. D. Labadie and J. McFaddin Surveys. **Discovery Data:** Structure by surface indications and refraction seismograph. Gulf, 1926. Field by Humble's Sterling 6 completed Jan. 30, 1929. **Structure:** Piercement type salt dome, cap rock 650, salt 1170 ft. **Producing Formations:** Salt rock 781-87 ft, Middle Oligocene 5500-5860 ft. **Production Total:** 179,000 bbls. **Gravity:** 20-32°. **Deepest Test:** Gulf's McFaddin 4-A at 7375 ft in Vicksburg. **Principal Leaseholders:** Gulf, Humble, Texas Gulf Sulphur Co., Shell. **Remarks:** Field abandoned in 1933.

NORTH DAYTON

7 mi nw Dayton. H&TC 118, 119, 120, 124, 125 and 135 Surveys. **Discovery Data:** Structure by surface indications of elevation, gas seeps. Field by Paraffin Oil Co.'s Fee 3 completed in Sept., 1905. **Structure:** Piercement type salt dome, cap rock 580 ft, salt 800 ft. **Producing Formations:** Cap rock and Miocene, 400 ft to 1100 ft, Vicksburg 4075-5188 ft. Average sand thickness in deep pay 32 ft. **Production in 1949:** 33,704 bbls; through 1949: 2,300,547 bbls; daily, March 1, 1950: 105 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 23-25°. **Deepest Test:** Deep Rock's A. McCloskey 1 at 10,020 ft (1 mi off se flk). **Oil Outlet:** Trucks. **Principal Leaseholders:** D. W. Schilling, Texas Co., Production Maintenance Co.

SOUTH DAYTON

6 mi s Liberty. **Discovery Data:** Field by Gulf's Sidney A. Smith 1, completed Nov. 20, 1948. **Structure:** Fault. **Producing Formation:** Yegua 8562-8612 ft. **Production in 1949:** 151,021 bbls; through 1949: 153,468 bbls; daily, March 1, 1950: 884 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 38.9°. **Deepest Test:** Discovery well at 9936 ft in Yegua. **Oil Outlet:** Gulf pipe line. **Principal Leaseholder:** Gulf.

SOUTH LIBERTY

3 mi s Liberty. M. G. White, D. Minchey, Wm Duncan, Eliz, Munson Surveys. **Discovery Data:** Structure by sulphur springs, gas escapes, oil seeps. Field by South Liberty Oil Co.'s Pickett 2, completed Jan. 1925. **Structure:** Piercement type salt dome, cap rock 350 ft, salt 500 ft. **Producing Formations:** Miocene 769-1760 ft, Frio 3090-3870 ft, Cook Mt. 4585-6145 ft. **Production in 1949:** 1,334,327 bbls; through 1949: 17,972,049 bbls; daily, March 1, 1950: 5801 bbls. **Producing Wells, March 1, 1950:** 100 with 9 rigs running. **Gravity:** 22-42°. **Deepest Test:** L. M. Josey et al's Jos. Mitchel Est. 1 at 7833 ft in Cook Mountain. **Oil Outlets:** Gulf 8-in, Sun 10-in, Texas 10-in. **Principal Leaseholders:** C. D. Ehrhardt, Grace Oil, J. W. Mccom, Noble & Baker, Sadler Prod., Sun, Gulf, Lenoir M. Josey et al, Floyd L. Karsten, K. B. Knox, Sam Maceo et al, W. A. Moncrief, Cities Service.

MADISON COUNTY

DAY

2 mi w Madisonville. J. Crownover Survey. **Discovery Data:** Structure by seismograph and core drilling. Field by Sun Oil Co.'s Day 3, completed July 25, 1948. **Structure:** Salt dome. **Producing Formation:** Wilcox 1903-35, 2371-72 ft. **Production in 1949:** 3818 bbls; through 1949: 8093 bbls; daily, March 1, 1950: 6 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 25°. **Deepest Test:** Carpenter & Herney's Connor 1 at 3511 ft in Wilcox. **Oil Outlets:** Trucks. **Principal Leaseholders:** Sun.

MADISONVILLE (Distillate)

7½ mi sw Madisonville. Amy Boatright Survey. **Discovery Data:** Structure by geophysical survey & subsurface geology. Field by West Prod. Co. et al's H. M. Boring 1, completed Oct. 7, 1946. **Structure:** Fault. **Producing Formations:** Edwards 9495-9570, 9614-30 ft. **Production in 1949:** 23,759 bbls; through 1949: 30,104 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 55.8°. **Deepest Test:** Discovery well at 12,563 ft in Rodessa. **Oil Outlets:** Trucks. **Principal Leaseholders:** West Prod. Co. & Noranda Oil Co. **Remarks:** First commercial production in county.

MATAGORDA COUNTY

ARCH

3 mi nw Mildfields. I&GN Survey. **Discovery Data:** Structure by subsurface geology and reflection seismograph. Field by Rowan Drlg. Co. & Texas Gulf Prod. Co.'s G. F. Stovall et al, completed Aug. 8, 1948. **Structure:** Deep seated dome. **Producing Formations:** Frio 6364-66 ft. **Production in 1949:** 82,908 bbls; through 1949: 105,490 bbls; daily, March 1, 1950: 317 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 37.1°. **Deepest Test:** Discovery well at 8760 ft in Frio. **Oil Outlet:** Eastern States pipe line. **Principal Leaseholders:** Rowan & Texas Gulf Prod. Co.

ARMOUR (McCroskey)

2 mi sw McCroskey, I&GN 7. D. Fenton Surveys. **Discovery Data:** Structure by reflection seismograph, Petty Exploration Co., for Pierce Estate in 1937. Field by Pierce Estate's Fee 1-A, completed Feb. 23, 1938. **Structure:** Fault. **Producing Formations:** Marginulina 6590-6626 ft, Frio 7187-96 ft. **Production in 1949:** 1008 bbls; through 1949: 194,-574 bbls; daily, March 1, 1950: None reported. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 34-37.6°. **Deepest Test:** Sun's Pierce Estate 1 at 9010 ft in Frio. **Oil Outlet:** Truck. **Principal Leaseholders:** W. R. Godsey, Pierce Estate Fee. **Remarks:** Originally known as McCroskey.

BAY CITY (Van Vleck)

1½ mi nw Van Vleck, Maria Cummins and I&GN 1 thru 5 & 7 thru 10 Surveys. **Discovery Data:** Structure by surface and subsurface geology, reflection seismograph, DeGolyer et al, 1932. Field by Skelly et al's Cobb 1, completed April 6, 1934. **Structure:** Deep seated salt dome. **Producing Formations:** Frio 7000-8500 ft, 8 sands averaging 20 ft thickness. **Production in 1949:** 1,035,286 bbls; through 1949: 15,104,446 bbls; daily, March 1, 1950: 2384 bbls. **Producing Wells, March 1, 1950:** 53 with no rigs running. **Gravity:** 33-56°. **Deepest Test:** Skelly's Cobb 14-B at 11,465 ft in Vicksburg. **Oil Outlet:** Skelly pipe line. **Principal Leaseholder:** Skelly. **Remarks:** Originally called Van Vleck field.

BAY CITY, EAST (Distillate)

1½ mi e Bay City. I&GN 4, Henry Goslin 2 & M. Connel Surveys. **Discovery Data:** Structure by subsurface geology and reflection seismograph. Field by Skelly-Stanolind-Tide Water's G. P. Hardy & Horn 1, completed March 19, 1945. **Structure:** Closure against upthrown side of fault. **Producing Formations:** Frio 10,093-370 ft. **Production in 1949:** 5391 bbls; through 1949: 18,592 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 41.5°. **Deepest Test:** Skelly's Long 1 at 12,507 ft in Frio. **Oil Outlets:** Distillate trucked out. Sale of gas to City of Bay City. **Principal Leaseholders:** Skelly, Stanolind, Tide Water, Union of Calif.

BAY CITY, NORTH

4½ mi n Bay City. Jacob Betts Survey. **Discovery Data:** Structure by reflection seismograph. Field by Ohio Oil Co.'s E. L. McDonald Acct. 1-1, completed Aug. 21, 1942. **Structure:** Fault. **Producing Formations:** Frio 7750-66, 7865-83, 8203-53, 8333-8411 ft. **Production in 1949:** 492,163 bbls; through 1949: 2,980,271 bbls; daily, March 1, 1950: 1206 bbls. **Producing Wells, March 1, 1950:** 28 with no rigs running. **Gravity:** 34.7-38° **Deepest Test:** Ohio's G. D. Everett 1-A at 9498 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** Ohio, Sun.

BLESSING (Distillate)

1¾ mi sw Blessing. I&GN 1, H&GN A-208, P. Pierce & J. E. Pierce Surveys. **Discovery Data:** Structure by reflection seismograph, Gem Oil Co. and Humble. Field by The Texas Co.'s Pierce 1, completed June 26, 1940. **Structure:** Fault. **Producing Formations:** Frio 8280-8320, 8426-61 ft. **Gravity:** 55-59°. **Deepest Test:** American Liberty and Texas Co.'s Dela Braden 1, 10,149 ft in Frio. **Principal Leaseholders:** Humble, Texas, American Liberty. **Remarks:** Production goes to gasoline plant in field, and no separation and gauge are made on lease.

BLESSING, EAST

3 mi se Blessing. John Holmes Survey. **Discovery Data:** Structure by reflection seismograph. Field by Amerada Pet. Corp.'s I, Laughlin 1, completed July 26, 1946. **Structure:** Faulted dome. **Producing Formation:** Frio. 8832-46. **Production in 1949:** 1835 bbls; through 1949: 8882 bbls; daily, March 1, 1950: 7 bbls. **Producing Wells, March 1, 1950:** 1

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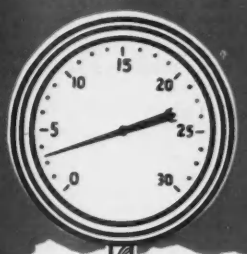

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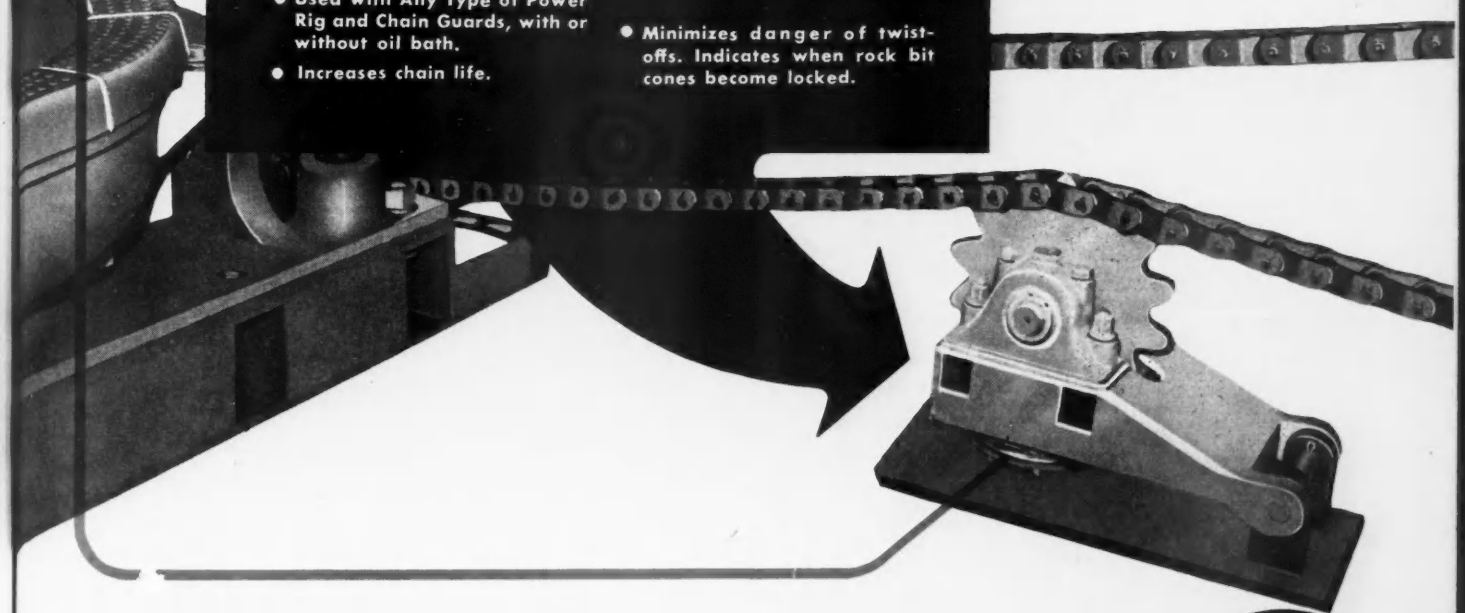

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with no rigs running. **Gravity:** 47.2°. **Deepest Test:** Discovery well at 11,515 ft in Basal Frio. **Oil Outlet:** Trucks. **Principal Leaseholder:** Amerada Pet. Corp.

BUCKEYE
In and around Buckeye townsite. East portions J. C. Keller and G. B. M. Cotton Surveys. **Discovery Data:** Structure by surface geology, Magnetometer, torsion balance, and reflection seismograph. Field by United North and South Development Co.'s Stoddard 1, completed Sept. 13, 1932. **Structure:** Deep dome. **Producing Formations:** Lower Marginulina-Frio, 7750-7925 ft. Average sand thickness 60 ft. **Production in 1949:** 1273 bbls; through 1949: 843,360 bbls; daily, March 1, 1950: 3 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 38°. **Deepest Test:** 10,502 ft in Frio. **Oil Outlet:** Truck. **Principal Leaseholders:** United North & South Dev. Co.

BUCKEYE, SOUTH
3½ mi sw Buckeye field. J. B. & M. Cotton Surveys. **Discovery Data:** Structure by reflection seismograph, United North & South Development Co., while rechecking Buckeye. Field by United North & South's Stoddard A-1 completed June 14, 1937. **Structure:** Deep seated dome. **Producing Formations:** Frio 8107-20, 9831-46, 9960-10,040, 10,280-310 ft. **Production in 1949:** 3127 bbls; through 1949: 310,277 bbls; daily, March 1, 1950: 7 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 36.5°. **Deepest Test:** Barnsdall's Stoddard 1 at 10,790 ft in Frio. **Oil Outlet:** Truck. **Principal Leaseholders:** United North & South Dev. Co. **Remarks:** Field was known as Wilson Creek before being abandoned in Aug., 1942, but was renamed Buckeye, South when reopened later same year.

BUTTERMILK SLOUGH (Abandoned)
West of Palacios, near Turtle Bay. J. Duncan Survey. **Discovery Data:** Structure by reflection seismograph, Sun, 1936. Field by Sun's Cavallin 1 completed July 20, 1939. **Structure:** Deep seated salt dome. **Producing Formations:** Frio 7850-60 ft. **Production Total:** 10,745 bbls. **Gravity:** 45°. **Deepest Test:** Discovery well at 9582 ft in Frio. **Principal Leaseholder:** Sun. **Remarks:** Abandoned in 1942. Only two wells drilled.

CITRUS GROVE (Gas)
5 mi sw Citrus Grove townsite, 3 mi e Collegeport. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Continental's Savage 1, completed July 9, 1939. **Structure:** Anticline. **Producing Formations:** Miocene 3750-60, 3970-4008, 4080-4140, 4210-25 ft. **Deepest Test:** Continental's Anderson 1 at 6555 ft in Miocene. **Oil Outlet:** Dow Chemical Co. (gas) pipe line. **Principal Leaseholder:** Dow Chemical. **Remarks:** Sometimes called Collegeport field. Dow Chemical (Freeport) takes entire output.

GULF (Big Hill) (Abandoned)
5 mi ne Matagorda. Ira Ingram, Wm. Simpson Surveys. **Discovery Data:** Structure by elevation, gas seeps, sulphur water. Field by Cash and Goode's Mayes 1 completed in 1902. **Structure:** Piercement type salt dome, cap rock 825 ft, salt 1100 ft. **Producing Formations:** Oil was from cap rock, as is sulphur. Oil production depleted. **Production Total:** 211,000 bbls. **Gravity:** 20°. **Deepest Test:** Fain Drlg. Co.'s Baer 1 at 6779 ft in Miocene. **Principal Leaseholder:** Texas Gulf Sulphur Co. **Remarks:** Texas Gulf Sulphur Co. has produced sulphur here since 1919. Surface mound has subsided due to heavy sulphur production. No oil produced since 1907.

HAMMAN
1½ mi se Bay City. E. Hall, J. T Belknap, P. Bertrand & I&GN X-3 Surveys. **Discovery Data:** Structure by reflection seismograph, Hamman Exploration Co., 1934-35. Field by Hamman's Cleveland 1, completed March 1, 1936. **Structure:** Deep dome. **Producing Formations:** Frio 8100-9330 ft (5 pays). **Production in 1949:** 172,349 bbls; through 1949: 6,525,593 bbls; daily, March 1, 1950: 532 bbls. **Producing Wells, March 1, 1950:** 20 with no rigs running. **Gravity:** 38-56°. **Deepest Test:** Union Oil of Calif.'s Richers 1, 10,927 Ft. **Oil Outlet:** To Hamman refinery at field. **Principal Leaseholders:** Hamman, Pan American Prod. Co., Atlantic. **Remarks:** At one time called Bay City field, Hamman operates a natural gasoline plant in the field.

HAWKINSVILLE (Depleted)
NE of Hawkinsville. Kingston & Powell, Thos. Williams Survey. **Discovery Data:** Structure by refraction seismograph, Gulf, 1928. Geophysical work, Sun, 1935. Field by Sun Oil Co.'s Craig Est. 1, completed Sept. 4, 1936. **Structure:** "Mushroom" type salt dome, cap rock 100 ft, salt 600 ft. **Producing Formations:** Miocene 5150-75 ft. **Production Total:** 2000 bbls. **Gravity:** 30°. **Deepest Test:** Sun's Craig Est. 2 at 6905 ft in Frio. **Principal Leaseholders:** Sun, Humble. **Remarks:** This well later went to salt water and was abandoned. Gulf drilled approximately 20 dry holes on and off the dome before Sun drilled discovery well.

LUCKY
3 mi se Bay City. Elisha Hall Survey. **Discovery Data:** Structure by reflection seismograph. Field by Stanolind's Huebner 1, completed March 31, 1941. **Structure:** Faulted anticline **Producing Formations:** Frio 7840-10,400 ft (7 pays). **Production in 1949:** 69,738 bbls; through 1949: 716,423 bbls; daily, March 1, 1950: 160 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 39-58. **Deepest Test:** 14,104 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholder:** Stanolind. **Remarks:** Includes Lucky, South field.

MARKHAM
3 mi nw Markham townsite. Wm. Hadden, H. Parker Surveys. **Discovery Data:** Structure by elevation and gas seeps. Field by Hardy Oil Co.'s Hudson 1, completed Jan. 6, 1908. **Structure:** Piercement type salt dome, cap rock 1500 ft. **Producing Formations:** Miocene 1200-2300 ft, Catahoula 2300-3600 ft, average sand thickness of 30 ft, Frio 3730-4880 ft. **Production in 1949:** 283,722 bbls; through 1949: 11,267,353 bbls; daily, March 1, 1950: 774 bbls **Producing Wells, March 1, 1950:** 44 with no rigs running. **Gravity:** 25-40°. **Deepest Test:** 9285 ft in Vicksburg. **Oil Outlet:** Texas 6-in. **Principal Leaseholders:** Magnolia, Hamill & Hamill, Powers Prod. Co., Thomar Oil, Thompson et al.

MARKHAM, NORTH
North of Markham. Yarborough and I&GN 2 Surveys. **Discovery Data:** Structure by reflection seismograph, Ohio Oil Co., 1937. Field by Ohio's Cornelius 1, completed Sept. 13, 1938. **Structure:** Deep dome faulted. **Producing Formations:** Frio 6930-8410 ft (7 pays). **Production in 1949:** 762,803 bbls; through 1949: 9,560,764 bbls; daily, March 1, 1950: 1826 bbls. **Producing Wells, March 1, 1950:** 46 with 1 rig running. **Gravity:** 34-50°. **Deepest Test:** C. L. & A. H. Rowan et al's Mrs. Clara Mason 1 at 10,467 ft. **Oil Outlet:** Texas Co. 6-in pipe line. **Principal Leaseholders:** Ohio, Sun.

MIDFIELDS
18 mi sw Bay City. I&GN Survey. **Discovery Data:** Structure by reflection seismograph. Field by Sun Oil Co.'s Strnadel 2, completed Jan. 15, 1946. **Structure:** Deep dome. **Producing Formations:** Frio 9050-9110, 9112-40 ft. **Production in 1949:** 497,236 bbls; through 1949: 1,394,811 bbls; daily, March 1, 1950: 1311 bbls. **Producing Wells, March 1, 1950:** 29 with 1 rig running. **Gravity:** 43-58°. **Deepest Test:** 10,849 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholder:** Sun Oil.

PALACIOS (Distillate)
1 mi n Palacios. L. Goodwin & S. Perkins Surveys. **Discovery Data:** Structure by reflection seismograph, Horad Exploration Co., for G. W. Strake. Shot by Sun, 1934, and then worked by Glenn McCarthy. Field by Atlantic Refining & McCarthy's Foley 1, completed March 31, 1937. **Structure:** Deep dome, faulted. **Producing Formations:** Frio 7580-9275 ft, average sand thickness 35 ft. **Production in 1949:** 14,578 bbls; through 1949: 203,346 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 53°. **Deepest Test:** 11,327 ft in Frio. **Oil Outlets:** Tank car and barge, Houston Pipe Line Co.'s 16-in (gas). **Principal Leaseholder:** Atlantic.

SARGENT
½ mi n Sargent. Thos. McCoy & D. Deckro Surveys. **Discovery Data:** Field by H. A. Potter's H. T Freeman 3, completed March 14, 1949. **Producing Formation:** 6324-39 ft. **Production in 1949:** 9995 bbls; through 1949: 9995 bbls; daily, March 1, 1950: 53 bbls. **Producing** Wells, March 1, 1950: 2 with 1 rig running. **Gravity:** 34.9-40.7°. **Deepest Test:** H. A. Potter's H. T. Freeman 1 at 6904 ft. **Oil Outlet:** Trucks. **Principal Leaseholder:** H. A. Potter.

SHEPPERD'S MOTT (Abandoned)
6 mi ne Wadsworth. **Discovery Data:** Structure by reflection seismograph. Field by Continental Oil Co.'s H. B. Hawkins 3, completed July 14, 1942. **Structure:** Salt dome. **Producing Formations:** Catahoula 3840-65 ft, Miocene 3840-5240 ft, Frio 8155-65 ft. **Production Total:** 2400 bbls. **Deepest Test:** 9230 ft in Frio. **Principal Leaseholder:** Continental.

SUGAR VALLEY
4 mi ne Van Vleck. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Superior Oil Co. of Calif.'s F. B. Peterson 1, completed June 18, 1943. **Structure:** Deep seated dome. **Producing Formations:** Frio 7674-10,135 ft (13 pays). **Gravity:** 38-58°. **Production in 1949:** 2,077,100 bbls; through 1949: 6,287,269 bbls; daily, March 1, 1950: 5085 bbls. **Producing Wells, March 1, 1950:** 120 with 1 rig running. **Gravity:** 38.58°. **Deepest Test:** Sun & Skelly's G. Lawrence 1, at 11,993 ft in Vicksburg. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** Superior, Skelly Stanolind, Humble, Sun, Texas, Union.

TIDEHAVEN
1 mi w El Maton. J. W. E. Wallace, Hosia Tilley Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s Live Oak Farms 1, completed Aug. 4, 1946. **Producing Formations:** Frio 8450-8785 ft. **Production in 1949:** 117,657 bbls; through 1949: 304,651 bbls; daily, March 1, 1950: 380 bbls. **Producing Wells, March 1, 1950:** 9 with no rigs running. **Gravity:** 44-52°. **Deepest Test:** 11,157 ft in Frio. **Oil Outlets:** Magnolia & Texas pipe lines. **Principal Leaseholder:** Magnolia.

MONTGOMERY COUNTY

CONROE
4 mi se Conroe. **Discovery Data:** Structure by surface indications, refraction seismograph, and "trend play" instrumental in drilling. Prior to discovery, geophysics had indicated structure, showing apex near center of present proven area and about 2 mi se discovery; hence it was thought at first that geophysical prospect might be separate from field opened by Strake. Field by G. W. Strake's South Texas Development Co. 1, completed December 13, 1931. **Structure:** Domal structure 6 mi in diameter. Has local highs separated by saddle on e end w sides with oil sands arching over them. Between n and s ends there are several faults and a graben of large displacement runs across field. **Producing Formations:** Minor oil-gas sand shortly below top of Yegua around 5000 ft and main oil sand lower in Yegua at 5000 to 5250 ft with depth of most wells from 5100 to 5150 ft. Oil and gas showings also occur in shallower sands. Average sand thickness 30 ft. **Production in 1949:** 11,543,262 bbls· through 1949: 281,365,-598 bbls; daily, March 1, 1950: 28,015 bbls. **Producing Wells, March 1,** 1950: 861 with no rigs running. **Gravity:** 35-51°. **Deepest Test:** Strake's Krohn 1-W, 12,020 ft in Wilcox. **Oil Outlets:** Tide Water 8-in, Humble 8-in, American Liberty 8-in, Sun 6-in. **Principal Leaseholders:** Humble, Tide Water, Houston Oil Co., G. W. Strake, Brown & Wheeler, Sun, Shell, Texas Co., J. S. Abercrombie, Standard of Kansas.

CONROE, WEST
4 mi nw Conroe field. W. S Allen Survey. **Discovery Data:** Structure by subsurface geology & seismograph. Field by Housh & Thompson's E. B. Clary 1, completed Nov. 23, 1938. **Structure:** Deep seated dome, fauled. **Producing Formations:** Yegua 4728-34, 47-33-40 ft. **Production in 1949:** 92,143 bbls; through 1949: 227,062 bbls; daily, March 1, 1950: 180 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 36°. **Deepest Test:** 5070 ft in Cockfield. **Oil Outlet:** Truck. **Principal Leaseholder:** C. N. Housh.

DECKER'S PRAIRIE (Distillate)
2 mi nw Tomball field. T. J. Stansbury Survey. **Discovery Data:** Field by Sterling O&R Co. & Daugherty & Kidd, W. Schiel 1, completed Sept. 15, 1949. **Producing Formation:** Cockfield 5486-91 ft. **Production in 1949:** 64 bbls; through 1949: 64 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Principal Leaseholders:** Sterling O&R Co. & Daugherty & Kidd.

FOSTORIA (Abandoned)
2 mi nw of Fostoria. **Discovery Data:** Structure by reflection seismograph. Field by Atlantic Ref. Co.'s Foster Lmbr. Co. 1 completed March 24, 1942. **Structure:** Fault closure. **Producing Formation:** Yegua 5790-94 ft. **Production Total:** 7298 bbls. **Gravity:** 39°. **Deepest Test:** Discovery well at 11,794 ft in Wilcox. **Principal Leaseholder:** Atlantic.

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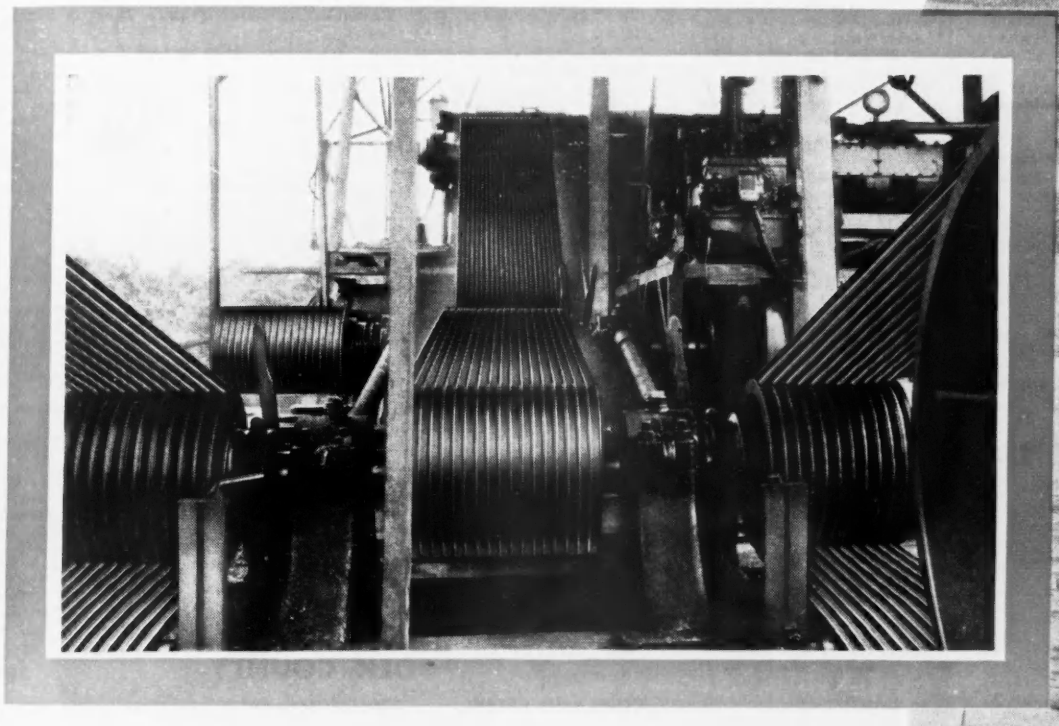

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FOSTORIA, EAST (Distillate—Shut In)
3 mi se Fostoria. M. B. Lawrence Survey. **Discovery Data:** Field by Amerada Pet. Corp.'s H. A. Godejohn 1, completed May 5, 1949. **Producing Formation:** Cockfield 5620-28 ft. **Gravity:** 61°. **Deepest Test:** Discovery well at 13,691 ft in Wilcox. **Principal Leaseholder:** Amerada.

LAKE CREEK
6 mi e Magnolia. **Discovery Data:** Structure by reflection seismograph. Field by Superior's McWhorter 1, completed Feb. 24, 1941. **Structure:** Fault closure. **Producing Formations:** Wilcox 8800-11,840 ft, 10 sands average thickness 25 ft. **Production in 1949:** (*crude only) 19,061 bbls; through 1949: 162,000 bbls; daily, March 1, 1950: 62 bbls. **Producing Wells, March 1, 1950:** 3 (crude) with no rigs running. **Gravity:** 38-67°. **Deepest Test:** 13,330 ft in Wilcox. Oil **Outlet:** Stanolind pipe line. **Principal Leaseholders:** Superior, Stanolind, Amerada. **Remarks:** Production figures do not include about 8 million bbls recovered by stripping plant in field.

MAGNOLIA (Distillate—Abandoned)
1 mi w Magnolia townstie. Jas. Scott Survey. **Discovery Data:** Structure by reflection seismograph. Field by Glenn McCarthy's Seyle 1, completed Oct. 8, 1941. **Structure:** Fault closure. **Producing Formation:** Wilcox 8448-58 ft. **Production Total:** 1682 bbls. **Gravity:** 57°. **Deepest Test:** 11,347 ft in Wilcox. **Principal Leaseholders:** McCarthy, Humble, Geo. H. Echols, Gulf.

PINEHURST
3 mi nw Pinehurst, 3 mi sw Lake Creek field. **Discovery Data:** Structure by reflection seismograph. Field by La Gloria Corp.'s Grogan-Cochran Lbr. Co. 1, completed Jan. 12, 1943. **Structure:** Fault closure. **Producing Formation:** Wixcox 8753-11,100 ft. **Production:** No crude produced since 1946 and no gauge on distillate from recycling plant. **Gravity:** 48-66°. **Deepest Test:** 11,963 ft in Wilcox. **Oil Outlet:** Stanolind pipe line. **Principal Leaseholders:** La Gloria, Stanolind, Sun, Pan American, Gray Wolfe.

SPLENDORA (Distillate—Abandoned)
Near town of Splendora and 7 mi e Conroe field. **Discovery Data:** Structure by reflection seismograph. Tide Water and Darby Pet. Corp., 1933. Field by Steen Drilling Co.'s Long Leaf Lbr. Co. 1, completed June 7, 1934. **Structure:** Domal structure, similar to other structures along the Conroe trend. **Producing Formations:** Yegua 5816-24 ft. **Production Total:** 1000 bbls. **Principal Leaseholders:** Tide Water, Darby Pet. Corp., Humble, Standard of Kansas, Steen Drilling Co.

WILLIS (Shut In)
4 mi nw Willis. Wm. Weir Survey. **Discovery Data:** Field by K. B. Knox Drilling Co.'s J. W. Woods 1, completed Sept. 15, 1945. **Structure:** Probable closure against faulting. **Producing Formations:** Yegua 3755-62 ft. Well shut in soon after discovery with little production. **Production Total:** 462 bbls. **Gravity:** 27°. **Principal Leaseholder:** K. B. Knox.

NEWTON COUNTY

CALL (Abandoned)
6 mi s Call. H&TC Survey. **Discovery Data:** Structure by reflection seismograph and torsion balance. Field by Houston Oil-Republic Prod.'s Peavy-Moore Lbr. Co. 1, completed Sept. 22, 1937. **Structure:** Faulted anticline. **Producing Formation:** Yegua 6908-18 ft. **Production Total:** 15,376 bbls. **Gravity:** 29°. **Deepest Test:** 11,002 ft in Wilcox. **Principal Leaseholders:** Houston Oil, Republic Oil, Gulf.

GIST
2 mi e Gist. R. L. White, HT&B, Jas. Gibson, J. D. Bland Surveys. **Discovery Data:** Structure by reflection seismograph. Field by G. R. Brown & Standard of Texas' Earl Hankamer 1, completed Sept. 10, 1947. **Structure:** Faulted anticline. **Producing Formations:** Frio and Hackberry 5610-7325 ft. **Production in 1949:** 209,115 bbls.; through 1949: 367,481 bbls.; daily, March 1, 1950: 639 bbls. **Producing Wells, March 1, 1950:** 14 with 2 rigs running. **Gravity:** 28-54°. **Deepest Test:** Discovery well at 7354 ft in Hackberry. **Oil Outlet:** Scurlock P. L. Co. **Principal Leaseholder:** Standard of Texas.

HARTBURG
1¼ mi w Hartburg Townsite. W. B. Ellis Survey. **Discovery Data:** Field by Texas Gulf Prod. Co. & Rowan Drlg. Co. Morgan et al 1, completed Jan. 18, 1949. **Producing Formation:** Hackberry 7556-60 ft. **Production in 1949:** 75,279 bbls; through 1949: 75,279 bbls; daily, March 1, 1950: 522 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs runnnig. **Gravity:** 42.6°. **Deepest Test:** Discovery well at 8013 ft. **Oil Outlet:** Truck. **Principal Leaseholders:** Texas Gulf Prod. & Rowan Drlg.

NEWTON
Jonathan D. Ray Survey. **Discovery Data:** Field by The Texas Co.'s Newton Co. Lmbr. Co. NCT-1, completed Feb. 6, 1949. **Producing Formation:** Wilcox 9644-60 ft. **Production in 1949:** 14,742 bbls.; through 1949: 14,742 bbls.; daily, March 1, 1950: 90 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 44.2°. **Deepest Test:** Discovery well at 12,601 ft. **Oil Outlet:** Truck. **Principal Leaseholder:** The Texas Co.

SABINE TRAM
10 mi se Call. J. B. Smyth, S. Goodwin, R. I. Richardson, E. Shoemaker Surveys. **Discovery Data:** Structure by surface, subsurface geology & seismograph survey. Field by Humble O&R Co. E. C. Hankamer 1, completed Nov. 8, 1945. **Structure:** Faulted anticline. **Producing Formations:** Yegua 7365-7790 ft, Cockfield 7955-8005 ft. **Production in 1949:** 25,806 bbls; through 1949: 79,017 bbls; daily, March 1, 1950: 95 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 38.4-62°. **Deepest Test:** Discovery well at 9009 ft in Yegua. **Oil Outlets:** Scurlock & Atlantic pipe lines. **Principal Leaseholder:** Humble & Gulf.

ORANGE COUNTY

BLAND (Abandoned)
1½ mi nw Orange field. James Dyson League. **Discovery Data:** structure by reflection seismograph & subsurface geology. Field by Dishman & Lucas, Ellen Bland 1, completed Dec., 1941. **Structure:** Salt dome. **Producing Formations:** Miocene 3130-45 ft. **Production Total:** 21,000 bbls. **Gravity:** 21°. **Deepest Test:** Discovery well at 3145 ft in Miocene. **Principal Leaseholder:** Dishman & Lucas. **Remarks:** Only 2 producing wells completed; area lies on nw flk of Orange Dome, but was carried as separate field until abandoned in Feb., 1943.

NORTH VIDOR (Distillate)
9 mi nw Port Neches, North, field. J. M. Swisher Survey. **Discovery Data:** Structure by subsurface geology. Field by Hinkle Drlg. Co. Miller-Vidor Land Co. 1, completed Jan. 25, 1947. **Structure:** Faulted anticline. **Producing Formations:** Frio 6930-40 ft, Hackberry 7765-80 ft. **Production in 1949:** 32,221 bbls; through 1949: 77,924 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 50-53°. **Deepest Test:** Gulf is Miller-Vidor Ld Co et al 4, 9975 ft in Vicksburg. **Oil Outlet:** Magnolia pipe line. **Principal Leaseholders:** Hinkle Drlg. Co., Gulf Oil Corp.

ORANGE
6 mi w Orange. Wm. Dyson, S. M. Luce, B. Garner, J. Dyson Surveys. **Discovery Data:** Strutcure by broken surface, gas escapes. Field by Rio Bravo Oil Co.'s Bland 1, completed Aug. 13, 1913. **Structure:** Salt dome, salt 7120 ft. **Producing Formations:** Miocene 1600-5200 ft, average sand thickness 17 ft. Heterostegina 5570-90 ft, Vicksburg 5940-6120 ft, Frio & Hackberry 4400-7600. **Production in 1949:** 473,427 bbls; through 1949: 36,743,578 bbls; daily, March 1, 1950: 1430 bbls. **Producing Wells, March 1, 1950:** 74 with 2 rigs running. **Gravity:** 20-35°. **Deepest Test:** 10,510 ft in Frio. **Oil Outlets:** Humble 8-in, Sun 6-in, Gulf 6-in. **Principal Leaseholders:** C. L. Brown, Kilmarnock Oil Co., W. V. Bowles & Co., Gulf. **Remarks:** Includes Orange, West & South fields.

ORANGE, NORTH
1½ mi ne Orange field. C. West Survey. **Discovery Data:** Structure by reflection seismograph. Field by Placid Oil Co.'s Wm. Winfree 1, completed July 8, 1948. **Structure:** Fault. **Producing Formation:** Frio 7710-15 ft. **Production in 1949:** 16,694 bbls; through 1949: 38,705 bbls; daily, March 1, 1950: 65 bbls. **Producing Well, March 1, 1950:** 1 with no rigs running. **Gravity:** 42°. **Deepest Test:** Discovery well at 8095 ft in Frio. **Oil Outlet:** Gulf pipe line. **Principal Leaseholder:** Placid Oil Co.

PORT NECHES
2 mi n Port Neches. Mary E. Hall 1 and 2, and T. J. Notgrass, J. Beaumont, J. V. Polk Surveys. **Discovery Data:** Structure by surface indications, torsion balance and refraction seismograph, Texas Co., 1928. Field by Texas Co.'s Kuhn 1, completed May 10, 1929. **Structure:** Salt dome, salt 7250 ft. **Producing Formations:** Miocene 2300-4380 ft, Marginulina 4540-5230, Frio 5800-6000 ft. **Production in 1949:** 795,278 bbls; through 1949: 10,465,427 bbls; daily, March 1, 1950: 2109 bbls. **Producing Wells, March 1, 1950:** 52 with no rig running. **Gravity:** 19-38°. **Deepest Test:** The Texas Co.'s H. J. Kuhn 29 at 9470 ft in Frio. **Oil Outlets:** Sun, Texas Co. pipe lines. **Principal Leaseholders:** Texas Co., Phillips. **Remarks:** Includes Port Neches, West field.

PORT NECHES, NORTH
1½ mi nw Port Neches field. John Stephenson Survey. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Hinkle Drlg. Co.'s Adcok 1, completed Sept. 15, 1946 **Structure:** Faulted dome. **Producing Formations:** Hackberry 8750-80 ft, Frio 8760-95 ft. **Production in 1949:** 384,141 bbls; through 1949: 1,140,796 bbls; daily, March 1, 1950: 2150 bbls. **Producing Wells, April 1, 1950:** 39 with 1 rig running. **Gravity:** 39-60°. **Deepest Test:** Hinkle Drlg. Co.'s E. E. Langham (N. Outpost) 1, 9748 ft in Hackberry. **Oil Outlet:** Gulf P. L. Co. **Principal Leaseholders:** Gulf, Shell, Lloyd H. Smith, Inc.

POLK COUNTY

COPELAND CREEK
2 mi se Goodrich Twst, A Viesca League. **Discovery Data:** Field by R. H. Abercrombie's W. A. Crum 1, completed March 13, 1949. **Producing Formations:** Jackson 3338-44 ft, Wilcox 7054-66, 7116-23 ft. **Production in 1949:** 95,650 bbls; through 1949: 95,650 bbls; daily, March 1, 1950: 410 bbls. **Producing Wells, March 1, 1950:** 15 with no rigs running. **Gravity:** 27-38.2°. **Deepest Test:** Discovery well at 7792 ft. **Oil Outlets:** Trucks. **Principal Leaseholder:** R. H. Abercrombie.

COPELAND CREEK, EAST
1 mi e Copeland Creek field, A. Viesca League. **Discovery Data:** Field by Wesley West & J. M. West Jr.'s West Securities Co. & Texas Long Leaf Lbr. Co., completed Nov. 8, 1949. **Producing Formation:** Jackson 3342-52 ft. **Production in 1949:** 1,494 bbls; through 1949: 1,494 bbls; daily, March 1, 1950, 58 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 32.3°. **Deepest Test:** Discovery well at 7550 ft. **Oil Outlets:** Trucks.

GOODRICH (Shut In)
2 mi e of Goodrich A. Viesca 7-league grant. **Discovery Data:** Structure by subsurface geology and reflection seismograph. Field by Pan American's Texas Long Leaf 1, completed Nov. 14, 1941. **Structure:** Faulted anticline. **Producing Formations:** Yegua 4030-50 ft. **Production:** Shut in after producing 72,900 bbls. **Gravity:** 34°. Discovery well at 9,966 ft in Wilcox. **Principal Leaseholder:** Pan American.

LIVINGSTON
9 mi se Livingston, A. Viesca & Jno. Swinney Surveys. **Discovery Data:** Structure by surface and subsurface geology, also torsion balance indications of deep dome. Field by Dick Schwab's Carlton-Davis 1, completed Oct. 18, 1932. **Structure:** Deep seated dome, faulted. **Producing Formations:** Jackson 3285-3450 ft Yegua 4160-5830 ft, Sparta 6030-6360 ft, Wilcox 6380-7080 ft. **Production, in 1949:** 1,353,704 bbls; through 1949: 16,599,986 bbls; daily, March 1, 1950: 3,478 bbls. **Producing Wells, March 1, 1950:** 145 with no rigs running. **Gravity:** 37-40°. **Deepest Test:** Humble's Whitforth 1, 11,023 ft. in Wilcox. **Oil Outlet:** Shell 6-in. **Principal Leaseholders:** Humble, Gem Oil, Owenby Drlg. Co., Sun, Midstates, McDannald Oil Co., Shell.

MORGAN'S CREEK
Isaac Parker Survey. **Discovery Data:** Field by Carleton D. Speed Jr. et al's C. C. Perkins et al 2, completed Jan. 3, 1949. **Producing Formation:** Jackson 3305-24 ft. **Production in 1949:** 91,008 bbls;

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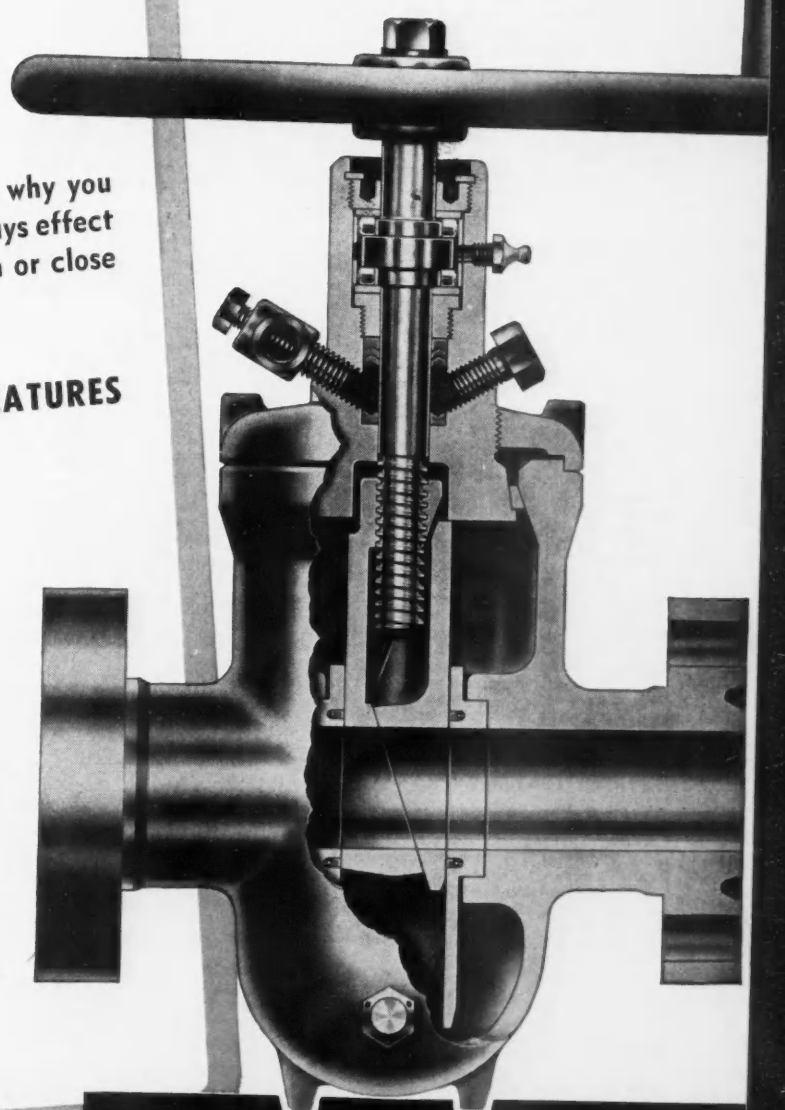

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through 1949: 91,008 bbls; daily, March 1, 1950: 644 bbls. **Producing Wells, March 1, 1950:** 11 with no rigs running. **Gravity:** 29°. **Oil Outlet:** Pan American pipe line. **Principal Leaseholders:** Carleton D. Speed, Jr., et al.

SCHWAB-ACE

8 mi se Livingston field, J. Menard, P. A. Sublett & G. S. Thomas Surveys. **Discovery Data:** Structure by trend play, torsion balance indication of deep dome. Field by Dick Schwab's Kirby-West 2, completed Jan. 26, 1933. **Structure** Salt dome. **Producing Formations:** Yegua 4800-60 ft., Wilcox 7740-7855 ft. **Production, in 1949:** 74,477 bbls; through 1949: 1,050,619 bbls; daily March 1, 1950: 160 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 40-47°. **Deepest Test:** 9667 ft in Wilcox. **Oil Outlet:** Truck to Shell pipe line at Livingston. **Principal Leaseholders:** H. G. Ritchie et al, Shell, Peyton Bros.

SEGNO

5 mi se Segno. **Discovery Data:** Structure by refraction seismograph and torsion balance, Gulf, Humble, 1933. Field by J. K. Dorrance's Wing 1, completed Dec. 24, 1936. **Structure:** Faulted anticline. **Producing Formation:** Yegua 5150-6560 ft, Wilcox 8000-8180 ft. **Production in 1949:** 846,955 bbls; through 1949: 15,373,857 bbls; daily, March 1, 1950: 1,985 bbls. **Producing Wells, March 1, 1950:** 102 with no rigs running. **Gravity:** 37-56°. **Deepest Test:** Gulf's Wing 48, 11,743 ft in Wilcox. **Oil Outlet:** Gulf 6-in. **Principal Leaseholders:** J. K. Dorrance, Humble, Gulf, La Quinta Oil, Ray et al, H. E. Williams et al.

SAN JACINTO COUNTY

COLD SPRINGS

2½ mi s Cold Springs townsite. **Discovery Data:** Structure by reflection seismograph, Shell, 1933. Field by Navarro Oil's Foster Lbr. Co. 1, completed Feb. 24, 1945. **Structure:** Folding and faulting. **Producing Formations:** Yegua 4340-5530 ft, Wilcox 7860-7915 ft. **Production in 1949:** 247,449 bbls; through 1949: 931,142 bbls; daily, March 1, 1950: 509 bbls. **Producing Wells, March 1, 1950:** 24 with no rigs running. **Gravity:** 39-50°. **Deepest Test:** 9738 ft in Wilcox. **Oil Outlet:** Scurlock. **Principal Leaseholder:** Butcher-Arthur.

COLINE

5 mi sw Cold Springs, Jas Rankin Jr. Survey. **Discovery Data:** Field by Butcher-Arthur, Inc.'s John A. Jones 1, completed Mar. 15, 1949. **Producing Formations:** Cockfield 4384-88 ft., Frio 4492-96 ft. **Production in 1949:** 20,909 bbls; through 1949: 20,909 bbls; daily, March 1, 1950: 160 bbls. **Producing Wells, March 1, 1950:** 3 with 1 rig running. **Gravity:** 42.3°. **Deepest Test:** Discovery well at 8367 ft. **Oil Outlet:** Truck. **Principal Leaseholder:** Butcher-Arthur, Inc.

EVERGREEN (Distillate)

5 mi wsw Cold Springs field, 4 mi s of Evergreen, Vital Flores Survey. **Discovery Data:** Structure by reflection seismograph. Field by Mac Drlg. Co.'s Cynthia Payne 1, completed Nov. 1, 1947. **Structure:** Faulted anticline. **Producing Formation:** Wilcox 7594-96 ft. **Production in 1949:** 4,789 bbls; through 1949: 19,168 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 56.1°. **Deepest Test:** Discovery well, 8250 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholder:** Mac Drilling Co. **Remarks:** No crude produced since 1947.

LICK BRANCH

3 mi s Mercy field, B. B. Sturgess & S. Lusk Surveys. **Discovery Data:** Field by Floyd L. Karsten's E. Malick 1, completed Mar. 1, 1949. **Producing Formation:** Wilcox 8589-8612, 8614-24, 8644-56 ft. **Production in 1949:** 31,369 bbls; through 1949: 31,369 bbls; daily, March 1, 1950: 630 bbls. **Producing Wells, March 1, 1950:** 6 with 1 rig running. **Gravity:** 40.5-45°. **Deepest Test:** Discovery well at 8683 ft in Wilcox. **Oil Outlet:** Atlantic pipe line. **Principal Leaseholder:** Floyd L. Karsten.

MERCY

1½ mi ne Mercy, 6 mi nw Cleveland. **Discovery Data:** Structure by reflection seismograph. Field by Shell's Central Coal & Coke Co. 1, completed Jan. 28, 1942. **Structure:** Fault. **Producing Formation:** Wilcox 8230-8350 ft. **Production in 1949:** 568,038 bbls; through 1949: 6,525,671 bbls; daily, March 1, 1950: 1,345 bbls. **Producing Wells, March 1, 1950:** 37 with no rigs running. **Gravity:** 37°. **Deepest Test:** Shell's Central Coal & Coke 11, 14,004 ft in Wilcox. **Oil Outlet:** Shell 6-inch. **Principal Leaseholders:** Shell, Stanolind. **Remarks:** Includes Mercy, West field.

SHEPHERD (Distillate)

4 mi s Shepherd townsite, Wm. Hayes Survey. **Discovery Data:** Structure by torsion balance, Atlantic; gravimeter, Gulf, 1938; reflection seismograph, Shell, Amerada, Atlantic, Atlatl Royalty Co., 1939. Field by Harrison & Abercrombie's Sun Co. 1, completed Oct. 9, 1940. **Structure:** Faulted anticline. **Producing Formation:** Wilcox 8215-77 ft. **Production in 1949:** 467 bbls; through 1949: 71,636 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 55°. **Deepest Test:** Magnolia's Dixon & Falvey 2 at 11,520 ft in Wilcox. **Oil Outlet:** Shell pipe line. **Principal Leaseholders:** Abercrombie, Magnolia, Harrison Oil Co.

TRINITY COUNTY

GLENDALE (Distillate)

3 mi w Glendale Townsite, Henry Bond Survey. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia's Bolton 2, completed March 8, 1946. **Structure:** Deep dome. **Producing Formation:** Edwards 10,500-535 ft. **Production in 1949:** 2,859 bbls; through 1949: 5,451 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 57°. **Deepest Test:** Magnolia's Bolton 2, 12,505 ft in Trinity. **Oil Outlets:** Trucks. United Gas (gas). **Principal Leaseholders:** Magnolia & Continental Oil Co.

GLENDALE, NORTHWEST (Distillate)

8 mi wnw Glendale field, John Chambliss Survey. **Discovery Data:** Field by Humble O&R Co.'s Thompson Bros. Mineral Corp. et al 1, completed Sept. 7, 1948. **Structure:** Deep dome. **Producing Formations:** Buda 10,246-286 ft, Georgetown 10,310-370 ft. **Production in 1949:** 1995 bbls; through 1949: 2897 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 57°. **Deepest Test:** Discovery well at 12,005 ft in L. Cretaceous. **Oil Outlets:** Trucks. United Gas (gas). **Principal Leaseholder:** Humble.

TYLER COUNTY

CAMP ELEVEN

5 mi se Spurger, Theo. Cushing League. **Discovery Data:** Structure by reflection seismograph. Field by American Republics Corp.'s American Republics-Houston Oil Fee 1, completed Jan. 9, 1942. **Structure:** Fault. **Producing Formation:** Wilcox 7997-8008, 8024-35 ft. **Production in 1949:** 24,512 bbls; through 1949: 484,045 bbls; daily, March 1, 1950: 53 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 44°. **Deepest Test:** Houston Oil-American Republics' Higgins 1, 8402 ft in Wilcox. **Oil Outlets:** American Pet. pipe line to Atlantic pipe line. **Principal Leaseholder:** American Republics.

EAST HILLISTER

8 mi ne Warren Twst., Arthur Hutchins Survey. **Discovery Data:** Structure by reflection seismograph. Field by Humble O&R Co.'s Wm. Rice Inst. 1, completed Nov. 4, 1948. **Producing Formations:** Cockfield 4946-49 ft, Wilcox 7342-50, 7640-46, 8228-72 ft. **Production in 1949:** 60,665 bbls; through 1949: 63,023 bbls; daily, March 1, 1950: 560 bbls. **Producing Wells, March 1, 1950:** 9 with no rigs running. **Gravity:** 46.1-59°. **Deepest Test:** Discovery well at 10,000 ft. **Oil Outlet:** Trucks. **Principal Leaseholders:** Humble & C. N. Housh.

FRED

4 mi sw Spurger field, G. T. W. Collins Survey. **Discovery Data:** Structure by reflection seismograph. Field by Stanolind-Republic-Houston Oil Co.'s Parker 1, completed Oct. 28, 1941. **Structure:** Fault. **Producing Formation:** Wilcox 8180-8218, 8605-30 ft. **Production in 1949:** 14,299 bbls; through 1949: 241,135 bbls; daily, March 1, 1950: 44 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 39.5°. **Deepest Test:** Stanolind's Parker 2, 10,006 ft in Wilcox. **Oil Outlet:** American Pet. pipe line to Atlantic pipe line. **Principal Leaseholder:** Stanolind.

HICKSBAUGH

4½ mi se Warren Twst, T&NO Survey. **Discovery Data:** Field by Humble O&R Co.'s Rice Inst. B-1, completed May 8, 1949. **Producing Formation:** Wilcox 8480-83 ft. **Production in 1949:** 3037 bbls; through 1949: 3037 bbls; daily, March 1, 1950: 10 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 39.6°. **Deepest Test:** Discovery well at 10,500 ft. **Oil Outlet:** Pure pipe line. **Principal Leaseholder:** Humble.

JOE'S LAKE

6 mi se Spurger, N. Hurd Survey. **Discovery Data:** Structure by reflection seismograph and torsion balance, Republic Prod. Co. and Houston Oil Co. (1934). Field by Republic and Houston's Hurd 2, completed May 2, 1937. **Structure:** Anticline. **Producing Formation:** Wilcox 7560-7650, 7650-7750 ft. **Production in 1949:** 317,078 bbls; through 1949: 5,506,257 bbls; daily, March 1, 1950: 836 bbls. **Producing Wells, March 1, 1950:** 31 with no rigs running. **Gravity:** 44°. **Deepest Test:** Houston Oil-American Republic's Fee (Hurd) 52, 10,625 ft in Wilcox. **Oil Outlet:** American Pet. Co., 6 in. **Principal Leaseholder:** American Republics.

RAMERS ISLAND

5½ mi ne Fred, Theo. Cushing League. **Discovery Data:** Structure by reflection seismograph. Field by American Republics Corp. & Houston Oil Co.'s Fee (Cushing) 1, completed Mar. 5, 1942. **Structure:** Fault. **Producing Formation:** Yegua 5390-5401 ft. **Production in 1949:** 23,797 bbls; through 1949: 257,036 bbls; daily, March 1, 1950: 54 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 45°. **Deepest Test:** American Republics & Houston Oil's Fee (Cushing) R-2, 8455 ft in Wilcox. **Oil Outlet:** Atlantic pipe line. **Principal Leaseholder:** American Republics.

SKILLERN (Gas)

5½ mi e Warren, B.B.B.&C. & J. Faircloth Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Amerada Pet. Corp.'s C. G. Hooks 1, completed Oct. 1, 1947. **Producing Formation:** Cockfield 4925-30 ft. **Deepest Test:** Discovery well at 9503 ft in Wilcox. **Principal Leaseholder:** Amerada Pet. Corp.

SOUTH HYATT

¾ mi s Hyatt, BBB&C Survey. **Discovery Data:** Surface geology led to discovery. Field by Atlantic et al's Houston Oil-American Rep. 1, completed Feb. 23, 1945. **Structure:** Domal type with faulting. **Producing Formation:** Wilcox 8380-83, 10,240-300 ft. **Production in 1949:** 20,395 bbls; through 1949: 108,412 bbls; daily, March 1, 1950: 40 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 50-54.9°. **Deepest Test:** Atlantic's Houston-American 1, 9015 ft. **Oil Outlet:** Trucks. **Prinpical Leaseholder:** Atlantic Rfg. Co.

SPURGER

¾ mi n Joe's Lake field, A. Sterne & E. T. Thompson Surveys. **Discovery Data:** Structure by torsion balance and reflection seismograph. Field by Republic Prod. Co.-Houston Oil Co.'s Fee (Sterne) 1, completed in 1932. **Structure:** Dome. **Producing Formation:** Cockfield 4685-4940 ft. **Production in 1949:** 4760 bbls; through 1949: 122,990 bbls; daily, March 1, 1950: 7 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 38°. **Deepest Test:** 7720 ft in Wilcox. **Oil Outlet:** American Pet. pipe line. **Principal Leaseholder:** American Republics.

SWEARINGEN

6 mi ene Warren Twst. W. R. Parker Survey. **Discovery Data:** Field by P. T. Sharples' D. D. Swearingen 1, completed Dec. 5, 1949. **Producing Formation:** Cockfield 5696-97 ft. **Production in 1949:** None; through 1949: none, daily, March 1, 1950: 84 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 46°. **Oil Outlet:** Truck. **Principal Leaseholder:** P. T. Sharples.

WURTSBAUGH
5 mi wsw Fred. Sarah Fields Survey. **Discovery Data:** Structure by reflection seismograph. Field by American Republics Corp.'s Kirby Lbr. Co. 1, completed July 21, 1947. **Structure:** Fault. **Producing Formations:** Wilcox 9070-78 ft. **Production in 1949:** 2158 bbls; through 1949: 11,181 bbls; daily, March 1, 1950: 8 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 42.9°. **Deepest Test:** Discovery well at 10,757 ft in Wilcox. **Oil Outlet:** American Petr. Co. **Principal Leaseholder:** American Republics.

WALKER COUNTY

KATY (Distillate)
5 mi w of Katy townsite, M. Bennett, T. S. Reese, Sec. 110; H&TC 80, 99, 109, 123 Surveys. **Discovery Data:** Structure by reflection seismograph, Stanolind, Humble, 1934. Field by Stanolind's Thorp 1, completed Feb. 12, 1935. **Structure:** Deepseated dome. **Producing Formations:** Yegua 6570-90, 6800-40, 6850-7120, 7305-7410 ft. **Deepest Test:** Humble's Freeman 1 at 11,080 ft in Wilcox. **Oil Outlet:** Houston pipe line. **Principal Leaseholders:** Humble, Stanolind, Sinclair Prairie, Amerada, Tide Water, Darby Pet. Co. **Remarks:** Humble operates a recycling plant in the field with a daily capacity of 500,000,000 cu ft of gas.

KATY, NORTH
Extension to Katy distillate field producing oil. **Discovery Data:** Field by Humble's Harry Hebert 1, completed April 27, 1943. **Structure:** Deep seated dome. **Producing Formations:** Yegua 6500-6640 (2 pays), 6815-75 ft. **Production in 1949:** 369,095 bbls; through 1949: 2,749,727 bbls; daily March 1, 1950: 816 bbls. **Producing Wells, March 1, 1950:** 66 with no rigs running. **Gravity:** 45°. **Deepest Test:** Stanolind & Amerada's Pattison 1 at 8000 ft in Saline Bayou. **Oil Outlet:** Humble pipe line. **Principal Leaseholders:** Humble, Kirby, Stanolind, Houston Oil Co. **Remarks:** This field cannot be completely divorced from the Katy distillate field to the south, being the same structure. Meticulous care in oil production technique is needed here because of the proximity of salt water sand below, and the tremendous gas cap above the producing sands.

SAM HOUSTON
5 mi e Huntsville. J. J. Crowson, S. H. Ewing Surveys. **Discovery Data:** Structure by surface and subsurface geology. Field by Moran Oil Co.'s Gibbs Bros. 1, completed May 6, 1946. **Structure:** Fault. **Producing Formations:** Yegua 2360-2485 ft. **Production in 1949:** 1825 bbls; through 1949: 14,467 bbls; daily March 1, 1950: 5 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 25°. **Deepest Test:** Discovery well at 6031 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholder:** Moran Corp.

UNNAMED (Distillate)
5½ mi w Magnolia Twst. John M. Stephens Survey. **Discovery Data:** Field by The Texas Co., Wm. H. Rice Inst. 1, completed May 1, 1949. **Producing Formations:** Wilcox 10,290-304 ft. **Production:** shut in since discovery. **Gravity:** 49.4°. **Producing Wells, March 1, 1950:** 0 with no rigs running. **Deepest Test:** Discovery well at 12,561 ft in Wilcox. **Principal Leaseholder:** The Texas Co.

WASHINGTON COUNTY

BRENHAM
8 mi sw Brenham, S. M. Williams & J. Hodge Surveys. **Discovery Data:** Structure by surface indications of elevation, gas seeps and oil show in water well. Field by Brenham Oil Co.'s Schulenberg 2 completed Oct. 8, 1915. **Structure:** Piercement type salt dome, cap rock 800 ft, salt 1150 ft. **Producing Formations:** Pliocene 190-290 ft, Oakville 950-57 ft, Cook Mountain 1350-70 ft. **Production in 1949:** 790 bbls; through 1949: 365,111 bbls; daily, March 1, 1950: None reported. **Producing Wells, March 1, 1950:** 7 (last report). **Gravity:** 17°. **Deepest Test:** 10,524 ft in Wilcox. **Oil Outlet:** Truck. **Principal Leaseholder:** Joe Pomykal.

CLAY CREEK
12 m n Brenham, N. Clay & J. F. Perry Surveys. **Discovery Data:** Structure by surface geology, Sun Oil Co., 1926, and core tests. Field by Sun's Grote 1, completed Oct. 10, 1928. **Structure:** Piercement type salt dome, cap rock 1800 ft., salt 3160 ft. **Producing Formations:** Yegua 1155-1200 ft, Sparta 1250-1350 ft, Queen City 1570-80 ft. **Production in 1949:** 159,677 bbls; through 1949: 6,089,750 bbls; daily, March 1, 1950: 588 bbls. **Producing Wells, March 1, 1950:** 49 with 1 rig running. **Gravity:** 23-27°. **Deepest Test:** Magnolia's C. Rene 1 at 9019 ft in Midway. **Oil Outlet:** Sun pipe line to loading rack. **Principal Leaseholder:** Sun Oil Co. **Remarks:** Sometimes called Gay Hill.

WHARTON COUNTY

ABEL BORDEN (Mackey) (Abandoned)
1½ mi e Mackey. E. M. Cox Survey. **Discovery Data:** Structure by reflection seismograph and torsion balance, Magnolia 1937 and 1938. Field by J. F. Hutchins' Borden 2, completed Jan. 20, 1940. **Structure:** Fault: **Producing Formations:** Frio 4758-71 ft. **Production Total:** 46,945 bbls. **Gravity:** 24°. **Deepest Test:** 6557 ft in Frio. **Principal Leaseholders:** Magnolia, J. F. Hutchins.

ALLEN
5 mi sse Pierce. Mark Weiss Survey. **Discovery Data:** Structure by subsurface geology. Field by Lloyd A. Smith & McKay Donkin's J. C. Allen 1, completed Sept. 8, 1948. **Structure:** Faulted anticline. **Producing Formations:** Frio 7107-09, 7188-96 ft. **Production in 1949:** 17,009 bbls; through 1949: 22,209 bbls; daily, March 1, 1950: 40 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 46°. **Deepest Test:** The Texas Co.'s E. M. Redwine 1 at 7372 ft. **Oil Outlet:** Trucks. **Principal Leaseholders:** Lloyd A. Smith & McKay Donkin.

BLUE BASIN (Gas)
1 mi s Magnet-Withers field. L. P. Ogden, Jos. Hyland Surveys. **Discovery Data:** Structure by torsion balance and reflection seismograph—Pure & Texas Co., 1932. Field by The Texas Co.'s G. F. Kluck 1, completed April 23, 1937. **Structure:** Deep seated dome. **Producing Formations:** Catahoula 4640-80 ft, Frio 5650-70 ft. **Deepest Test:** Pure Oil Co.'s Edith Paige 1 at 9131 ft in Vicksburg. **Principal Leaseholders:** F. L. Karsten, The Texas Co., Johnston & Johnston.

BOLING
2 mi e Boling. S. F. Austin 3-1/6 Lge., D. W. Anthony, Simon Miller & Jas. Scott Surveys. **Discovery Data:** Structure by gas seeps, sulphur water and subsurface geology. Field by The Texas Co.'s Taylor 3, completed Dec. 14, 1925. **Structure:** Piercement type salt dome, cap rock 425 ft, salt 975 ft. **Producing Formations:** Cap rock, Miocene, Oligocene 300-5670 ft. **Production in 1949:** 993,706 bbls; through 1949: 11,701,413 bbls; daily, March 1, 1950: 2,770 bbls. **Producing Wells, April 1, 1950:** 106 with 1 rig running. **Gravity:** 20-33°. **Deepest Test:** Dick Schwab's Floyd Est. 1, 8007 ft in Vicksburg. **Oil Outlets:** Sinclair 8-in, Humble 8-in. **Principal Leaseholders:** Danciger, Gulf, Mackhank Pet., Sinclair, Union Oil, Grubb & Hawkins, Cecil Hagen, Sparta & Mikton. **Remarks:** Sulphur produced from cap rock by Texas Gulf Sulphur.

CRESCENT (Gas)
3 mi n Pierce. WCRR Survey. **Discovery Data:** Field by Texowell Serv. & Mach. Co.'s Hamburger 1-A, completed July 10, 1945. **Structure:** Closure assoc. with faulting. **Producing Formations:** Frio 4450-60 ft. **Deepest Test:** 7511 ft in Cockfield. **Principal Leaseholder:** Ferguson & Hutchinson Est.

DABOVAL
7 mi sw El Campo. **Discovery Data:** Structure by reflection seismograph. Field by Amerada Pet. Co.'s C. P. J. Daboval 1, completed Oct. 2, 1944. **Structure:** Fault. **Producing Formations:** Frio 7025-28, 7140-44, 7230-34 ft. **Production in 1949:** 83,622 bbls; through 1949: 379,446 bbls; daily, March 1, 1950: 170 bbls. **Producing Wells, April 1, 1950:** 10 with no rigs running. **Gravity:** 46.7-57°. **Deepest Test:** 7615 ft in Vicksburg. **Oil Outlet:** Sinclair pipe line. **Principal Leaseholders:** Floyd Karsten, Sinclair.

EAST BERNARD (Distillate)
1½ mi n East Bernard. **Discovery Data:** Structure by torsion balance and reflection seismograph, Sterling O&R Co., subsurface geology, H. C. Cockburn, 1939. Field by Cockburn's Leveridge 1, completed May 27, 1940. **Structure:** Fault. **Producing Formations:** Cook Mountain 7900-7920, 7995-8020, 8035-80 ft. **Production in 1949:** 3166 bbls; through 1949: 28,816 bbls. **Producing Wells, April 1, 1950:** 4 with no rigs running. **Gravity:** 51-55. **Deepest Test:** 8667 ft in Cook Mountain. **Oil Outlets:** Distillate trucked out, Texas Nat. Gas Utilities Co. pipes gas to East Bernard. **Principal Leaseholder:** H. C. Cockburn. **Remarks:** Was known as O'Conner field.

EGYPT (Distillate)
1 mi ne Egypt. A. Edgar & T. Heard Surveys. **Discovery Data:** Structure by reflection seismograph, Humble. Field by Hudgins-Ferguson-Hutchin's Duncan 1, completed May 5, 1945. **Structure:** Fault. **Producing Formations:** Oakville 2821-55 ft, Frio 4287-92 ft, Yegua 6700-25, 7160-64 ft. **Production in 1949:** 11,950 bbls; through 1949: 14,684 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Deepest Test:** Claude B. Hamill's Duncan 2 at 7809 ft in Cook Mountain. **Principal Leaseholders:** C. B. Hamill, R. W. Milner, Jr.

EL CAMPO
5 mi nw Danevang. **Discovery Data:** Structure by geophysics and subsurface geology. Field by Seaboard Oil Co.'s W. W. Duson 1, completed Jan. 9, 1944. **Structure:** Fault. **Producing Formations:** Frio 6095-6965 (5 pays). **Production in 1949:** 115,235 bbls; through 1949: 739,226 bbls; daily, March 1, 1950: 285 bbls. **Producing Wells, March 1, 1950:** 10 with no rigs running. **Gravity:** 35°. **Deepest Test:** Seaboard's Holub 1, at 7726 ft in Vicksburg. **Oil Outlet:** Sinclair 3-in. **Principal Leaseholders:** Seaboard Oil, Cox, Rupert & Dan Clark.

EL CAMPO, SOUTH (Distillate)
1 mi nw El Campo field, 4 mi due s El Campo. ETRR Survey. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Floyd L. Karsten J. L. Reitz Est. 1, completed Dec. 3, 1946. **Structure:** Faulted anticline. **Producing Formations:** Frio 5560-6945 ft. **Production in 1949:** 19 bbls; through 1949: previous production included with El Campo field. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 45°. **Deepest Test:** 7532 ft in Frio. **Oil Outlet:** United Gas P. L. (gas). **Principal Leaseholder:** Floyd L. Karsten. **Remarks:** Called Reitz field originally.

EL CAMPO, WEST (Gobbler Creek)
5 mi wnw El Campo. Lyman Conkrite Survey. **Discovery Data:** Structure by reflection seismograph. Field by Grubb & Hawkins' R. C. Peters 1, completed March 31, 1947. **Structure:** Faulted anticline. **Producing Formations:** Frio 4520-45 ft. **Production in 1949:** 12,036 bbls; through 1949: 42,470 bbls; daily, March 1, 1950: 26 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 22.8°. **Deepest Test:** Grubb & Hawkins R. C. Peters 2, 5802 ft in Vicksburg. **Oil Outlet:** Trucks. **Principal Leaseholder:** Grubb & Hawkins. **Remarks:** Called Gobbler Creek at first.

HILLJE
5 mi s Hillje. ETRR 101, M & C, L. P. Ogden Surveys. **Discovery Data:** Structure by reflection seismograph, Texas Co., 1935-38. Field by Texas Co.'s Peters 1, completed Sept. 10, 1939. **Structure:** Fault. **Producing Formations:** Frio 5190-5250, 6535-45 ft. **Production in 1949:** 117,436 bbls; through 1949: 1,669,372 bbls; daily, March 1, 1950: 313 bbls. **Producing Wells, March 1, 1950:** 16 with no rigs running. **Gravity:** 27-33°. **Deepest Test:** 7501 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** Texas Co., Mackhank Pet., W. V. Bowles & Co., Rancho Oil, H. E. Walling.

HILLJE, SOUTH
1½ mi se Hillje field. L. L. Miller & M. & C. Surveys. **Discovery Data:** Structure by subsurface geology and reflection seismograph. Field by S. G. Harrison's T. N. Mauritz et al 1, completed March 23, 1945. **Structure:** Closure against faulting on south flk of Hillje structure. **Producing Formations:** Marginulina 5225-5865 ft (5 pays). **Production in 1949:** 67,039 bbls; through 1949: 328,510 bbls; daily, March 1, 1950: 155 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs

running. **Gravity:** 27-33°. **Deepest Test:** Discovery well at 7519 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** Sam Harrison, Navidad Co., Johnston & Johnston.

HUNGERFORD (Gas)

3½ mi n Hungerford. J. W. Moore, G. W. Singleton, A. Jackson Surveys. Field by Superior Oil of Calif.'s Hudgins et al 1, completed May 8, 1944. **Structure:** Fault. **Producing Formation:** Catahoula 3024-75 ft. **Deepest Test:** Discovery well at 8501 ft in Vicksburg. **Principal Leaseholder:** Chicago Corp.

HUTCHINS-KUBELA

4 mi n El Campo. Geo. W. Reynolds, H&TC, I&GN, G. C. Gifford Surveys. **Discovery Data:** Structure by subsurface geology and reflection seismograph. Field by Trinity Driller's Marek 1, completed March 21, 1936. **Structure:** Fault. **Producing Formations:** Frio 4500-4675 ft (4 pays). **Production in 1949:** 543,321 bbls; through 1949: 4,053,559 bbls; daily, March 1, 1950: 1308 bbls. **Producing Wells, March 1, 1950:** 58 with no rigs running. **Gravity:** 24°. **Deepest Test:** McDannald Oil Co.'s Johnson 4 at 7600 ft. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** Texas Co., L. M. Josey et al, Gilcrease Oil, J. B. Ferguson, John F. Merrick, McDannald Oil. **Remarks:** This field often classed as part of Pickett Ridge field.

HUTCHINS, SOUTH

2 mi nw El Campo. I&GN Survey. **Discovery Data:** Structure by subsurface geology. Field by Perry R. Bass et al's Lacy W. Armour et al 3, completed May 4, 1947. **Structure:** Faulted dome. **Producing Formations:** Frio 5735-5900 ft (4 pays). **Production in 1949:** 84,944 bbls; through 1949: 195,544 bbls; daily, March 1, 1950: 184 bbls. **Producing Wells, March 1, 1950:** 8 with no rigs running. **Gravity:** 30.3-47.6°. **Deepest Test:** McDannald Oil Co.'s K. C. Martin 2, 6515 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** McDannald Oil, Perry R. Bass et al.

LAKE VIEW (Gas)

3½ mi n El Campo. **Discovery Data:** Structure by surface geology and torsion balance. Field by Smith and McDannald's Mitchell 1, completed May 1, 1936. **Structure:** Faulted dome. **Producing Formations:** Catahoula 3100-3410 ft, Marginulina 3868-3960 ft, Frio 4520-4810 ft. **Deepest Test:** 7607 ft in Hockley. **Oil Outlet:** Houston pipe line. **Principal Leaseholder:** McDannald Oil Co.

LANE CITY

4 mi sw of Lane City. C. Castleman & W. Pettus Surveys. **Discovery Data:** Structure by reflection seismograph, Humble, 1937. Field by General Crude Oil's Security Bank & Trust 2, completed Nov. 24, 1944. **Structure:** Fault. **Producing Formations:** Frio 5330-80, 5410-5470 ft (2 pays). **Production in 1949:** 147,935 bbls; through 1949: 814,058 bbls; daily, March 1, 1950: 309 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 24-27°. **Deepest Test:** 6515 ft in Frio. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** General Crude, Texas Co., Texmass Pet Co.

LANE CITY TOWNSITE

Lane City Townsite. D. D. D. Baker Survey. **Discovery Data:** Structure by reflection seismograph & subsurface geology. Field by Sohio Pet.'s Lane City Twst. Unit 1, completed June 18, 1948. **Structure:** Faulted anticline. **Producing Formation:** Frio 5448-5530 ft. **Production in 1949:** 249,683 bbls; through 1949: 278,094 bbls; daily, March 1, 1950: 619 bbls. **Producing Wells, March 1, 1950:** 15 with 1 rig running. **Gravity:** 25.9°. **Deepest Test:** J. B. Ferguson et al's Brooks 1 at 6750 ft in Frio. **Oil Outlet:** Sohio pipe line. **Principal Leaseholders:** Sohio Pet., Scurlock Oil, Crossman & Hootkins.

LISSIE (Distillate)

1¾ mi s Lissie. A. J. Frye and GH&H Surveys. **Discovery Data:** Structure by reflection seismograph and torsion balance. Sun, 1934. Field by Gulfboard Oil Corp.'s Winnie Poole 1, completed August 14, 1940. **Structure:** Fault. **Producing Formations:** Yegua 6444-6735 ft (3 pays), Wilcox 9518-9680 ft (3 pays). **Production in 1949:** 26,106 bbls; through 1949: 68,609 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 49.7-55°. **Deepest Test:** 10,777 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholder:** Salt Dome Oil Corp. **Remarks:** Includes Lisie, South.

LOUISE

2½ mi se Louise townsite. **Discovery Data:** Structure by reflection seismograph, Pure, 1928. Field by Pure's Stewart 1, completed Dec. 14, 1933. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 4800-4810 ft, Frio 4075-6467 ft (6 pays). **Production in 1949:** 204,049 bbls; through 1949: 5,814,892 bbls; daily, March 1, 1950: 510 bbls. **Producing Wells, March 1, 1950:** 28 with 1 rig running. **Gravity:** 20-42°. **Deepest Test:** 8271 ft in Vicksburg. **Oil Outlet:** Texas Co. 4-in. **Principal Leaseholders:** Pure, Caddo Oil Co., S. G. Harrison. **Remarks:** Includes Louise, South & West fields.

LOUISE, NORTH (Gas)

9½ mi ne Louise. WCRR, F. Page, J. A. Hamilton Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Continental's O. F. Allenson 1, completed Jan. 20, 1943. **Structure:** Fault closure. **Producing Formations:** Miocene 2750-2988 ft, Frio 4120-4450 ft. **Deepest Test:** Continental's L. Peterson 1, 5545 ft in Frio. **Oil Outlet:** Tennessee Gas Trans. pipe line (gas). **Principal Leaseholders:** Continental, Salt Dome, Chicago Corp., Ralph A. Johnston.

MACH

Section 26, Mark Weiss Survey. **Discovery Data:** Field by Lloyd H. Smith & McKay Donkin's Kate Pougher 1, completed March 3, 1949. **Producing Formations:** Frio 6384-98 ft. **Production in 1949:** 39,486 bbls; through 1949: 39,486 bbls; daily, March 1, 1950: 145 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 37.9°. **Deepest Test:** Discovery well at 6822 ft in Frio. **Oil Outlet:** Trucks. **Principal Leaseholders:** Lloyd H. Smith & McKay Donkin.

MAGNET-WITHERS

2 mi w Magnet townsite. **Discovery Data:** Structure by torsion balance, H. C. Cockburn, 1931. Magnet field by Cockburn Oil Corp.'s Fee 1, completed Sept. 4, 1936; Withers field by Texas Co.'s Pierce Est. C-1, completed Jan. 4, 1936. **Structure:** Deep seated dome. **Producing Formations:** Marginulina-Frio 4000-5565 ft, Frio 6650-70. **Production in 1949:** 1,848,403 bbls; through 1949: 53,652,443 bbls; daily, March 1, 1950: 4207 bbls. **Producing Wells, March 1, 1950:** 238 with no rigs running. **Gravity:** 26°. **Deepest Test:** 8466 ft in Jackson. **Oil Outlets:** Texas 6-in, Humble pipe line. **Principal Leaseholders:** Humble, Texas Co., Pan-American, R. Y. Smith, Brazos O&G Co. **Remarks:** Includes Withers, West Magnet and Withers fields consolidated as one field July 1, 1942.

MATZKE (Gas—Abandoned)

2 mi sw Pierce. I&GN Survey. **Discovery Data:** Field by The Texas Co.'s H. R. Matzke 1, completed Jan. 10, 1945. **Structure:** Lenticular sand. **Producing Formations:** Frio 5779-84 ft. **Deepest Test:** Discovery well at 6345 ft in Frio. **Principal Leaseholder:** The Texas Co. **Remarks:** Well produced for short time and went to water. Field abandoned Oct. 27, 1945.

MENEFEE (Gas)

3½ mi n Louise. H. P. Mills, S. P. Middleton Surveys. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Salt Dome's J. Vitera 1, completed Dec. 10, 1943. **Structure:** Deep dome. **Producing Formations:** Frio 4543-58, 5240-44 ft. **Deepest Test:** 6504 ft in Vicksburg. **Outlet:** Tennessee Gas Trans. pipe line (gas). **Principal Leaseholder:** Salt Dome Oil Corp.

NEW TAITON (Distillate)

6 mi se New Taiton. Wm. Robinson Survey. **Discovery Data:** Field by Federal Royalty Co. & R. A. Welch's Myra S. Pryor 3, completed May 14, 1949. **Producing Formation:** 10,820-34 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 45.2°. **Deepest Test:** Discovery well at 10,834 ft. **Principal Leaseholders:** Federal Royalty Co., R. A. Welch.

NORTH WITHERS

On nw flank Magnet-Withers faulted dome. **Discovery Data:** Field by The Texas Co.'s Pierce Est. 68-C, completed Feb. 11, 1940. **Structure:** Faulted anticline. **Producing Formations:** Catahoula 4020-55 ft, Frio 5235-60, 5260-5410 ft. **Production in 1949:** 1,889,770 bbls; through 1949: Included with Magnet-Withers; daily, March 1, 1950: 4311 bbls. **Producing Wells, March 1, 1950:** 154 with no rigs running. **Gravity:** 26°. **Deepest Test:** 9200 ft in Vicksburg. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** F. W. Michaux et al, The Texas Co. **Remarks:** Texas Railroad Comm. separated N. Withers from Magnet-Withers in 1943 after the finding of major e-w fault.

PICKETT RIDGE

1 mi se Pierce. I&GN 24, 37, 48, 39 and 76, J. Telferner 2, H&TC, G. W. Reynolds, G. Gilford Surveys. **Discovery Data:** Structure by torsion balance, reflection seismograph, Texas Co., 1934. Surface and subsurface geology. Field by Texas Co.'s Pierce A-2, completed June 24, 1935. **Structure:** Fault. **Producing Formations:** Frio 4596-4719, 4770-90 ft. **Production in 1949:** 469,994 bbls; through 1949: 7,051,938 bbls; daily, March 1, 1950: 1648 bbls. **Producing Wells, March 1, 1950:** 49 with 1 rig running. **Gravity:** 25°. **Deepest Test:** 8888 ft in Jackson. **Oil Outlet:** Texas Co. 6-in. **Principal Leaseholders:** Texas Co., C. Andrade III, Armour et al, Von Roeder Trs. Withers, Pierce, et al. **Remarks:** Kubela field often included as part of Pickett Ridge.

PRASIFKA

3 mi ssw Lane City townsite. AB&M, S. Castleman, GWT&P Surveys. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Cockburn Oil Corp.'s Wharton Bank & Trust Co. 1, completed March 15, 1947. **Structure:** Anticline. **Producing Formations:** Frio 4198-4215 (gas), 4525-35 (gas), 5548-54 ft. **Production in 1949:** 70,230 bbls; through 1949: 70,230 bbls; daily, March 1, 1950: 452 bbls. **Producing Wells, March 1, 1950:** 10 with no rigs running. **Gravity:** 24.9°. **Deepest Test:** H. C. Cockburn's Prasifka 1 at 7348 ft. **Oil Outlet:** Trucks. **Principal Leaseholder:** H. C. Cockburn Oil Corp. **Remarks:** Originally gas only. Oil discovered in 1949.

SPANISH CAMP (Gas)

5 mi w Hungerford. R. Kuykendall, D. Wade, S. F. Austin Surveys. **Discovery Data:** Structure by reflection seismograph and torsion balance in 1934. Field by Felmont Oil Corp.'s Mitchell 1, completed Dec. 13, 1936. **Structure:** Fault. **Producing Formations:** Catahoula 2930-3026 ft, Discorbis 3085-3143, 3150-70 ft. **Deepest Test:** 8183 ft in Cockfield. **Oil Outlet:** Houston Pipe Line Co. **Principal Leaseholders:** Houston Oil, Ferguson & Hudgins, T. J. Hudgins, Tr.

TWIN BASIN (Distillate)

5½ mi se of El Campo townsite. ETRR Survey. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Floyd L. Karsten's C. L. Tucker 1, completed May 14, 1947. **Structure:** Anticline. **Producing Formations:** Frio 6535-90, 6720-28, 7080-85 ft. **Production in 1949:** 71 bbls; through 1949: 1288 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 54°. **Deepest Test:** Discovery well at 7352 ft in Yegua. **Oil Outlet:** Truck. **Principal Leaseholder:** Floyd L. Karsten. **Remark:** Once called Tucker field.

WEINHEIMER (Distillate)

5 mi nw El Campo. Frank Page, Lyman Conkrite Survey. **Discovery Data:** Field by R. J. Caraway, E. A. Weinheimer 1, completed May 8, 1949. **Producing Formations:** Frio 5102-04, 5217-24 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 47-49°. **Deepest Test:** P. L. D. Well Service Co.'s Weinheimer 1, at 5430 ft in Frio. **Principal Leaseholders:** P. L. D. Well Service Co., R. J. Caraway.

WEST BERNARD (Distillate)

5 mi se Lissie field. J. M. Rose Hrs., GH&H, M&C (C. W. White) Surveys. **Discovery Data:** Structure by reflection seismograph. Field by Tide Water Associated Oil Co.'s J. D. Hudgins 1, completed Aug. 13, 1947. **Structure:** Anticline. **Producing Formations:** Yegua 6705-25, 7680-7725 ft. **Production in 1949:** None; through 1949: 1553 bbls. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:**

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49-58°. **Deepest Test:** Discovery well at 7901 ft in Cook Mountain. **Principal Leaseholder:** Tide Water Associated Oil Co.

WHARTON (Gas)
1½ mi e Wharton Townsite. Randall Jones & Martin Allen Survey. **Discovery Data:** Structure by reflection seismograph. Field by Hunt Oil Co.'s Edwin Hawes 1, completed Dec. 10, 1948. **Structure:** Anticline. **Producing Formation:** Frio 5199-5202 ft. **Deepest Test:** Discovery well at 6521 ft in Frio. **Principal Leaseholder:** Hunt Oil Co.

WHARTON, WEST
2¾ mi w of Wharton Townsite. Robert Kuykendall League. **Discovery Data:** Field by Gulf Oil Corp's J. H. H. Dennis 1, completed May 15, 1949. **Producing Formation:** Frio 4516-23, 5300-76 ft. **Production in 1949:** 5698 bbls; through 1949: 5698 bbls; daily, March 1, 1950: 50 bbls. **Producing Wells, March 1, 1950:** 2 (oil) with no rigs running. **Gravity:** 23.1°. **Deepest Test:** Gulf's Dennis 3 at 6200 ft. **Oil Outlet:** Trucks. **Principal Leaseholder:** Gulf Oil Corp. **Remarks:** Discovery was a gasser. Oil discovered in Sept., 1949.

LOUISIANA

ACADIA PARISH

BAYOU MALLET
6 mi se Eunice, Sect. 14, 47, 51, 52-7s-1e. **Discovery Data:** Structure by reflection seismograph, Superior Oil Co., 1934. Shell worked with torsion balance, 1934. Field by Superior and Woodley Pet. Co., Smith 1, completed Jan. 4, 1936. **Structure:** Probable deep seated dome. **Producing Formations:** Heterostegina 6385-6405 ft, Marg. Howei 7190-9210 ft, Marg. Tex. 8538-8542 ft. **Production in 1949:** 581,063 bbls; through 1949: 2,362,276 bbls; daily, March 1, 1950: 2,087 bbls. **Producing Wells, March 1, 1950:** 32 with 1 rig running. **Gravity:** 35-46°. **Deepest Test:** 9830 ft in Vicksburg. **Oil Outlet:** Interstate Pipe Line 6-in to Baton Rouge. **Principal Leaseholders:** Superior Oil, Union Sulphur, Callery & Hurt.

BAYOU MALLET, SOUTH
Sect. 25-7s-1e. **Discovery Data:** Structure by reflection seismograph. Field by Union Sulphur Co.'s Kahn 1, completed April 11, 1945. **Structure:** Fault. **Producing Formations:** Miocene 9177-82, 9603-15 ft. **Production in 1949:** 125,712 bbls; through 1949: 310,154 bbls; daily, March 1, 1950: 409 bbls. **Producing Wells, March 1, 1950:** 8 with no rigs running. **Gravity:** 38°. **Deepest Test:** Discovery well at 10,320 ft in Vicksburg. **Oil Outlet: Interstate** 6-in to Baton Rouge. **Principal Leaseholders:** Union Sulphur, Amerada. **Remarks:** Appears to be fault controlled segment of Bayou Mallet field.

BOSCO
Sect. 26, 28, 33, 34-8s-3e. **Discovery Data:** Structure by refraction seismograph and torsion balance, Pure, 1929. Field by Superior and Pure's P. O. Hernandez 1, completed April 26, 1934. **Structure:** Deep dome. **Producing Formations:** Miocene 7825-8668 ft. **Production in** 1949: 872,175 bbls; through 1949: 30,218,825 bbls; daily March, 1950: 2275 bbls. **Producing Wells, March 1, 1950:** 42 with no rigs running. **Gravity:** 38-48°. **Deepest Test:** 12,247 ft in Miocene. **Oil Outlets:** Pure 4-in, Interstate pipe line to Baton Rouge. **Principal Leaseholder:** Superior. **Remarks:** Lies partly in St. Landry Parish.

BRANCH (Distillate)
Sect. 51-8s-2e. **Discovery Data:** Structure by Humble reflection seismograph, 1934. Field by Union Sulphur Co.'s J. P. Gueno 1, completed April 30, 1942. **Structure:** Faulted, probably deep seated salt dome. **Producing Formations:** Miocene 9918-11,821 ft (3 pays). **Production in 1949:** 207,407 bbls; through 1949: 973,536 bbls; daily, March 1, 1950: 439 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 46-51°. **Deepest Test:** Union Sulphur's Andrus 1-A, 11,947 ft in Vicksburg. **Oil Outlets:** Interstate, Standard pipe line to Baton Rouge. **Gas Outlet:** United Gas 6-in. **Principal Leaseholders:** Union Sulphur, Stanolind, Magnolia.

CROWLEY, NORTH
Sect. 33, 34, 45-8s-1e. **Discovery Data:** Structure by surface geology, reflection seismograph and gravity work. Humble, 1935. Field by Humble's Federal Land Bank 1, completed Sept. 22, 1937. **Structure:** Probable deep seated dome. **Producing Formations:** Miocene 4878-8000 ft (11 pays). **Production in 1949:** 1,724,285 bbls; through 1949: 18,080,-369 bbls; daily, March 1, 1950: 5018 bbls. **Producing Wells, March 1, 1950:** 50 with no rigs running. **Gravity:** 24-38°. **Deepest Test:** 10,632 ft in Lower Miocene. **Oil Outlet:** Interstate 6-in to Baton Rouge. **Principal Leaseholders:** Humble, Vincent & Welch, Peterson Drlg.

CROWLEY, SOUTH
4 mi s Crowley, Centering Sect. 22-10s-1e. **Discovery Data:** Structure by reflection seismograph, Humble, 1934. Field by Humble's Boyd & Finch 1, completed April 29, 1938. **Structure:** Dome. **Producing Formations:** Miocene 4364-9000 ft (6 pays). **Production in 1949:** 390 bbls; through 1949: 148,390 bbls; daily, March 1, 1950: 1 bbl. **Producing Well, March 1, 1950:** 1 with no rigs running. **Gravity:** 29-53°. **Deepest Test:** Sun's Leger 1 at 11,514 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholders:** Humble, Sun, Stanolind, Ohio.

EGAN
7 mi w Crowley, Sect. 31-9s-1w. **Discovery Data:** Structure by Calcasieu Oil Co. torsion balance, 1929. Field by Sun-Sohio's J. R. Dailey 1, completed May 30, 1943. **Structure:** Faulted dome. **Producing Formations:** Lower Miocene 9897-9908, 10,480-590, 10,102-108, 11,874-906 ft. **Production in 1949:** 2,372,170 bbls; through 1949: 8,787,282 bbls; daily, March 1, 1950: 6086 bbls. **Producing Wells, March 1, 1950:** 70 with no rigs running. **Gravity:** 34-51°. **Deepest Test:** Sun-Sohio's Regan 3, 13,500 ft in Vicksburg. **Oil Outlet:** Sun pipe line. **Principal Leaseholders:** Sun, Irwin-Hudson Co., Sohio, Texas Co.

EUNICE
2 mi ne shallow Ritchie field, Sect. 14. **Discovery Data:** Field by P. A. Ward's John Wilfert 2, completed Sept. 29, 1949. **Producing Formations:** Miocene 3414-16 ft. **Production in 1949:** 5926 bbls; through 1949: 5926 bbls; daily, March 1, 1950: 26 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 24.7°. **Deepest Test:** Discovery well at 3975 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** P. A. Ward.

IOTA
Sect. 11-9s-2w. **Discovery Data:** Union Sulphur Co.'s Medlenka 1, completed Jan. 23, 1945. **Structure:** Faulted dome. **Producing Formations:** Oligocene 8790-8825 ft, Miocene 9380-90 ft. **Production in 1949:** 437,934 bbls; through 1949: 684,074 bbls; daily, March 1, 1950: 1085 bbls. **Producing Wells, March 1, 1950:** 10 with no rigs running. **Gravity:** 32°. **Deepest Test:** Union Sulphur's Medlenka 2, 11,001 ft in Lower Miocene. **Oil Outlet:** Pelican pipe line. **Principal Leaseholder:** Crown Central.

JENNINGS
Sect. 40, 41, 42, 45, 46, 47, 48-9s-2w. **Discovery Data:** Structure by elevation, gas escapes, subsurface geology around flanks. Field by Jennings Oil Co.'s No. 1 (later Gulf's Jennings-Clemont lease), completed August, 1901. **Structure:** Piercement-type salt dome, cap rock 2000 ft, salt 3716 ft. **Producing Formations:** U. Miocene 1015-1650 ft. Lower Miocene 5020-8907 ft. **Production in 1949:** 1,206,052 bbls; through 1949: 100,999,388 bbls; daily, March 1, 1950: 3536 bbls. **Producing Wells, March 1, 1950:** 86 with no rigs running. **Gravity:** 25-38°. **Deepest Test:** 10,766 ft in Vicksburg. **Oil Outlets:** Barge, Continental 8-in, Interstate 6-in, Coastal 6-in, Shell 4-in pipe lines. **Principal Leaseholders:** W. B. Burton, Feldman, Pure, Gulf, Stanolind, Shell, Pan American, Superior, Glassell et al. **Remarks:** First field discovered in South Louisiana; has produced more oil than any other. Once known as Evangeline.

LEWISBURG
4 mi ne Church Point. **Discovery Data:** Structure by reflection seismograph. Field by Stanolind's Tweedel 1, completed Dec. 10, 1941. **Structure:** Faulted anticline. **Producing Formation.** L. Miocene 9090-10,200 ft (3 pays). **Production in 1949:** 109,883 bbls; through 1949: 317,840; daily, March 1, 1950: 563 bbls. **Producing Wells, March 1, 1950:** 4 with 1 rig running. **Gravity:** 48-61°. **Deepest Test:** 10,782 ft in Vicksburg. **Oil Outlet:** Truck. **Gas Outlet:** United Gas 4-in. **Principal Leaseholders:** Stanolind, Magnolia, Amerada. **Remarks:** Partly in St. Landry Parish.

LEWISBURG, SOUTH (Distillate)
1½ mi ne Church Point. Sect. 75-7s-3e. **Discovery Data:** Structure by reflection seismograph, Amerada Pet. Corp., 1939. Field by Amerada Pet. Corp.'s Clarence Daigle 1, completed Sept. 3, 1943. **Structure:** Deep seated fault. **Producing Formations:** L. Miocene 10,105-262 ft (4 pays). **Production in 1949:** 71,433 bbls; through 1949: 228,433 bbls; daily, March 1, 1950: 194 bbls. **Producing Wells, March 1, 1950:** 6 with 1 rig running. Gravity: 60°. **Deepest Test:** 10,600 ft L. Miocene. **Oil Outlet:** Trucks. **Principal Leaseholders:** Amerada, Union Sulphur, Cities Service.

MIDLAND
Sect. 49-10s-2w. **Discovery Data:** Field by Sun-Sohio Oil Co.'s Lapleau Est. 3, completed June 17, 1949. **Producing Formation:** Miocene 10,618-30 ft. **Production in 1949:** 3448 bbls; through 1949: 3448 bbls; daily, March 1, 1950: 33 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 42.8°. **Deepest Test:** Discovery well at 11,850 ft. **Oil Outlet:** Trucks. **Principal Leaseholders:** Sun, Sohio.

RITCHIE
6 mi sw Eunice, Sect. 20, 21-7s-1w. **Discovery Data:** Structure by torsion balance, Vincent & Welch, 1935. Field by Vincent & Welch's McManus 1, completed June 15, 1940. **Structure:** Faulted lenticular sands. **Producing Formations:** Miocene 3366-3514, 3681-86 ft. **Production in 1949:** 589, 484 bbls; through 1949: 2,941,083 bbls; daily, March 1, 1950: 1675 bbls. **Producing Wells, March 1, 1950:** 39 with 2 rigs running. **Gravity:** 25°. **Deepest Test:** Nicklos, Vincent & Welch's McManus 2-B, 9774 ft in Miocene. **Oil Outlets:** Continental pipe line. **Principal Leaseholders:** Nicklos, Vincent & Welch, Grubb & Hawkins, Bates & Cornell.

RITCHIE, NORTH
6 mi sw Eunice, Sect. 16-17s-1w. **Discovery Data:** Structure by reflection seismograph. Continental Oil Co. Field by Continental's Acadia Parish School Board 1, completed July 15, 1943. **Structure:** Deep seated faulted dome. **Producing Formations:** Lower Miocene 8576-8612, 9053-9060 ft. **Production in 1949:** 109,845 bbls; through 1949: 1,052,803 bbls; daily, March 1, 1950: 290 bbls. **Producing Wells, March 1, 1950:** 10 with no rigs running. **Gravity:** 26-50°. **Deepest Test:** 9909 ft in Lower Miocene. **Oil Outlet:** Continental pipe line to Westlake refinery. **Principal Leaseholders:** Continental, H. L. Hawkins.

TEPETATE
6 mi nw Iota, Sect. 28, 29, 30, 34-7s-2w. **Discovery Data:** Structure by torsion balance, Mordelo L. Vincent, 1930: reflection seismograph, Continental, 1934. Field by Continental's Ortigo 1, completed Aug. 2, 1935. **Structure:** Probable deep dome. **Producing Formations:** Cib. Hazz. 8260-323 ft, Marg. Tex. 8724-34,9163-68 ft. **Production in 1949:** 813,893 bbls; through 1949: 16,800,427 bbls; daily, March 1, 1950: 2077 bbls. **Producing Wells, March 1, 1950:** 57 with no rigs running. **Gravity:** 41°. **Deepest Test:** 10,598 ft in Miocene. **Oil Outlet:** Continental's 8-in pipe line. **Principal Leaseholder:** Continental.

TEPETATE, NORTH
Sect. 7, 10, 11, 13, 14, 17, 18-7s-1 2 w. **Discovery Data:** Structure by reflection seismograph, Atlantic Ref. Co., 1937. Field by Atlantic's Klumpff 1, completed Oct. 11, 1938. **Structure:** Fault closure. **Producing Formations:** Miocene 7415-9100 ft (11 pays). **Production in 1949:** 1,134,438 bbls; through 1949: 3,910,576 bbls; daily, March 1, 1950: 3598 bbls. **Producing Wells, March 1, 1950:** 52 with 1 rig running. **Gravity:** 31-56°. **Deepest Test:** 10,368 ft in Miocene. **Oil Outlets:** Continental's 6-in pipe line. **Principal Leaseholders:** Atlantic, Humble, Bates & Cornell.

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WEST MEREMENTAU (Distillate)

2½ mi sw South Jennings, Sect. 12-10s-2w. **Discovery Data:** Structure by seismograph, H. M. Naylor and others. Field by H. M. Naylor Oil Co.'s Acadia Development Co. 1, completed June 19, 1940. **Structure:** Probable deep seated dome. **Producing Formations:** Discorbis 9120-30 ft, Heterostegina 9515-9727 ft, Marginulina 10,198-10,208 ft. **Production in 1949:** 23,723 bbls; through 1949: 263,055 bbls; daily, March 1, 1950: 47 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 47-57°. **Deepest Test:** 10,885 ft in Marginulina. **Oil Outlet:** Continental pipe line. **Principal Leaseholders:** H. M. Naylor, Continental. **Remarks:** Also lies in Jeff Davis Parish.

ALLEN PARISH

NORTH ELTON (Distillate)

Sect. 22, 23-6s-3w. **Discovery Data:** Structure by geophysics, Bel Oil Corp., 1938. Field by Bel Oil Corp.'s Bel Estate 1, completed June 12, 1930. **Structure:** Faulted anticline. **Producing Formations:** Miocene 6834-37, 7272-82, 7408-12 ft. **Production in 1949:** 38,318 bbls; through 1949: 265,254 bbls; daily, March 1, 1950: 122 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 56.4°. **Deepest Test:** 9010 ft in Vicksburg. **Oil Outlet:** Truck. **Principal Leaseholders:** Bel Oil Corp., Stanolind.

SOUTH OBERLIN

2 mi s of Oberlin, Sect. 33-5s-4w. **Discovery Data:** Structure by reflection seismograph. Field by Humble O&R Co.'s J. A. Bel Est. 1-B, completed Feb. 11, 1946. **Structure:** Closure on fault. **Producing Formations:** Wilcox 12,650-12,669 ft. **Production in 1949:** 712 bbls; through 1949: 18,380 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 47.5°. **Deepest Test:** Humble Oil's Bel Est. 1-B at 13,150 ft in Wilcox. **Oil Outlet:** Truck, by Scurlock. **Principal Leaseholder:** Humble.

ASCENSION PARISH

DARROW

Sect. 29, 30, 31, 32, 33, 34, 36-10s-2e. **Discovery Data:** Structure by torsion balance, Gulf, 1937. Field by Rio Bravo Oil Co.'s Community 1, completed Sept., 1932. **Structure:** Piercement-type salt dome, salt 4900 ft. **Producing Formations:** Miocene 4008-35, 4776-4827, 5513-5900, 6900-7071, 8259-61, 9565-70 ft. Average sand thickness 36 ft. **Production in 1949:** 76,377 bbls; through 1949: 7,282,183 bbls; daily, March 1, 1950: 369 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 30-39°. **Deepest Test:** 10,013 ft in L. Miocene. **Oil Outlet:** Barge to Standard's Baton Rouge refinery. **Principal Leaseholder:** Humble.

SORRENTO

Sect. 11, 14, 15, 22, 23-10s-4e. **Discovery Data:** Structure by surface indications of gas seepages and refraction seismograph, Gulf, 1926. Field by Gulf's United Lands Co. 4, completed Feb. 1, 1928. **Structure:** Piercement-type salt dome, cap rock 1568 ft, salt 1920 ft. **Producing Formations:** Cap rock 867-901, 1312-33, 1615-50 ft, Middle Oligocene 4301-4332, 4408-30 ft. Average sand thickness 40 ft. **Production in 1949:** 34,874 bbls; through 1949: 1,470,956 bbls; daily, March 1, 1950: 88 bbls. **Producing Wells, March 1, 1950:** 8 with no rigs running. **Gravity:** 23-24°. **Deepest Test:** 12,038 ft in Oligocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** The Texas Co.

ASSUMPTION PARISH

NAPOLEONVILLE

6 mi nw Napoleonville, Sect. 136-12s-14e. **Discovery Data:** Structure by gas seeps which first attracted attention. Dome discovered by Gulf's refraction survey made in area, 1926. Field by George H. Echol's Kessler-Sternfels 1, Feb. 3, 1943. **Structure:** Piercement-type salt dome, cap rock 425 ft. **Producing Formations:** Miocene 5368-9856 ft (8 pays). **Production in 1949:** 243,151 bbls; through 1949: 997,323 bbls; daily, March 1, 1950: 585 bbls. **Producing Wells, March 1, 1950:** 8 with 1 rig running. **Gravity:** 37-54°. **Deepest Test:** 12,850 ft in Miocene. **Oil Outlet:** Interstate pipe line to Baton Rouge. **Principal Leaseholders:** Crosby Drlg., Shell. **Remarks:** Gypsum has been encountered as high as 413 ft and salt as high as 688 ft.

AVOYELLES PARISH

DAVID HAAS

3½ mi sw Bunkie, Sect. 9, 10, 11, 12-2s-2e. **Discovery Data:** Structure by reflection sesimograph. Field by Atlantic Refining's Haas Investment Co. 1, completed July 7, 1947. **Structure:** Faulted dome. **Producing Formations:** Sparta 7448-7534 ft, Wilcox 8470-8602 ft. **Production in 1949:** 1,086,699 bbls; through 1949: 1,779,320 bbls; daily, March 1, 1950: 3402 bbls. **Producing Wells, March 1, 1950:** 21 with no rigs running. **Gravity:** 44.7°. **Deepest Test:** Atlantic's W. D. Haas 1 at 8820 ft in Wilcox. **Oil Outlet:** Interstate pipe line to Baton Rouge. **Principal Leaseholder:** Atlantic Rfg., Jones, O'Brien, Kemp.

EOLA

Sect. 1, 5, 6, 7, 8-2s-3e. **Discovery Data:** Structure by reflection seismograph and torsion balance. Amerada, 1934-36. Sid Richardson, reflection seismograph, 1938. Field by Sid Richardson's Hass 1, completed Jan. 18, 1939. **Structure:** Deep seated faulted salt dome. **Producing Formations:** Cockfield 6400-6420 ft, Sparta 7600-7646 ft, Wilcox 8446-8600 ft. **Production in 1949:** 830,342 bbls; through 1949: 25,741,334 bbls; daily, March 1, 1950: 1997 bbls. **Producing Wells, March 1, 1950:** 58 with no rigs running. **Gravity:** 36-48°. **Deepest Test:** 11,935 ft in Wilcox. **Oil Outlets:** Interstate pipe line to Baton Rouge, United Gas 4-in, Southern Gas Line 8-in. **Principal Leaseholders:** Amerada, Sid Richardson, Gulf, Crosby, Drlg. Co., Paul Smith.

MARKSVILLE

3 mi n Marksville, Sect. 78-2n-4e. **Discovery Data:** Structure by subsurface geology and reflection seismograph. Field by Hunt Oil's H. H. Edwards 1, completed August, 1948. **Structure:** Anticline. **Producing Formations:** Wilcox 7916-7932. **Production in 1949:** 315,320 bbls; daily, March 1, 1950: 685 bbls. **Producing Wells, March 1, 1950:** 9 with no rigs running. **Gravity:** 46.8-48.1°. **Deepest Test:** Hunt Oil's H. H. Edwards 1, at 9117 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholders:** Hunt, Midstates.

BEAUREGARD PARISH

BANCROFT

Sect. 10, 14, 15-6s-13w. **Discovery Data:** Structure by geophysics, Republic Prod. Co., 1935. Gulf did considerable pendulum work in area in 1934. Field by Republic's Lutcher-Moore 1, completed May 4, 1938. **Structure:** Deep seated dome, faulted. **Producing Formations:** Eocene 7321-7976 ft. **Production in 1949:** 303,422 bbls; through 1949: 4,924,513 bbls; daily, March 1, 1950: 958 bbls. **Producing Wells, March 1, 1950:** 15 with no rigs running. **Gravity:** 43.9-47°. **Deepest Test:** 12,455 ft in Wilcox. **Oil Outlet:** Atlantic 8-in pipe line to Atreco, Texas. **Principal Leaseholder:** American Republics Corp., Roeser & Pendleton, Inc.

BANCROFT, NORTH

Sect. 24-5s-13w. **Discovery Data:** Field by Atlantic Refg. Co.'s Sabine River Lbr. Co. 1-A, completed Aug. 29, 1949. **Producing Formation:** Cockfield 9304-23 ft. **Production in 1949:** 27,729 bbls; through 1949: 27,729 bbls; daily, March 1, 1950: 339 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 39.6°. **Deepest Test:** Discovery well at 9586 ft in Cockfield. **Oil Outlet:** Atlantic pipe line. **Principal Leaseholder:** Atlantic Rfg. Co.

BANCROFT, SOUTH

5 mi s of Bancroft field, Sect. 27-6s-13w. **Discovery Data:** Structure by reflection seismograph. Field by Roeser & Pendleton's Columbia Land 1, completed November, 1948. **Structure:** Faulted. **Producing Formations:** Cockfield 10,239-252 ft. **Production in 1949:** 172,576 bbls; through 1949: 185,898 bbls; daily, March 1, 1950: 290 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 46.7°. **Deepest Test:** 11,540 ft in Cockfield. **Oil Outlet:** Atlantic pipe line. **Principal Leaseholder:** Roeser & Pendleton, Inc.

BEAR

9 mi ne DeQuincy, Sect. 27-6s-9w. **Discovery Data:** Structure by Humble's reflection seismograph, 1933. Field by General Crude Oil's Baldwin 1, completed April 9, 1943. **Structure:** Deep seated dome. **Producing Formations:** Miocene 6104-6134, 6510-6530 ft. **Production in 1949:** 184,797 bbls; through 1949: 1,350,181 bbls; daily, March 1, 1950: 486 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 43°. **Deepest Test:** 9412 ft in Cook Mountain. **Oil Outlets:** Continental's pipe line to loading racks at Kernan, then by tank car to Westlake refinery. **Principal Leaseholders:** General Crude, Shell, Phillips.

BEAR HEAD CREEK

5 mi nw DeQuincy, Sect. 17, 18-6s-11w. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s Powell Lbr. 1, completed June, 1946. **Structure:** Closure against fault. **Producing Formation:** Cockfield 8403-17 ft. **Production in 1949:** 28,358 bbls; through 1949: 94,066 bbls; daily, March 1, 1950: 57 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 43.9°. **Deepest Test:** 8900 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholder:** Magnolia.

BIVENS

9½ mi s Merryville, Sect. 7, 8, 12-5s-11, 12w. **Discovery Data:** Structure by reflection seismograph. Field by Atlantic Refining's Newport Industries 1, completed May 17, 1947. **Structure:** Faulted closure. **Producing Formation:** Cockfield 7236-78 ft. **Production in 1949:** 209,926 bbls; through 1949: 380,731 bbls; daily, March 1, 1950: 651 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 41.1°. **Deepest Test:** 9636 ft in Wilcox. **Oil Outlet:** Atlantic pipe line. **Principal Leaseholder:** Atlantic Rfg. Co.

BIVENS, WEST

3½ mi sw Meadows. **Discovery Data:** Structure by reflection seismograph. Field by Atlantic Rfg. Co.'s Kirby Lbr. 1, completed November, 1948. **Structure:** Faulted. **Producing Formations:** Wilcox 9328-9344 ft. **Production in 1949:** 91,753 bbls; through 1949: 96,760 bbls; daily, March 1, 1950: 304 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 39°. **Deepest Test:** 9810 ft in Wilcox. **Oil Outlet:** Atlantic pipe line. **Principal Leaseholders:** Atlantic, Pan American.

CANEY CREEK

3 mi ne Longville. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s Doornbos-McPherson E-1, completed June, 1948. **Structure:** Fault. **Producing Formations:** Cockfield 8176-8190 ft. **Production in 1949:** 38,502 bbls; through 1949: 48,977 bbls; daily, March 1, 1950: 121 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 48.4°. **Deepest Test:** 8750 ft in Cook Mountain. **Oil Outlet:** Tank car. **Principal Leaseholder:** Magnolia.

FIELDS

8 mi nw DeQuincy, Sect. 34-6s-12w. **Discovery Data:** Structure by Sohio reflection seismograph in 1943. Field by Sohio's Lutcher-Moore Lbr. Co. 1, completed Sept. 18, 1943. **Structure:** Deep seated, faulted dome. **Producing Formations:** Cockfield 8011-20, 8216-28, 8498-8508 ft. **Production in 1949:** 138,038 bbls; through 1949: 664,041 bbls; daily, March 1, 1950: 344 bbls. **Producing Wells, March 1, 1950:** 9 with no rigs running. **Gravity:** 47°. **Deepest Test:** 10,911 ft in Wilcox. **Oil Outlet:** Sohio 4-in pipe line. **Principal Leaseholders:** Sohio, Houston Oil.

GORDON (Distillate)

8 mi ne of DeQuincy, Sect. 25-6s-10w. **Discovery Data:** Structure by Humble's reflection seismograph in late 1930's. Field by Union Oil Co. of Calif.'s Edgewood Land and Logging Co. 1, completed March 1, 1944. **Structure:** Deep seated faulted. **Producing Formations:** Miocene 5319-27, 6767-87 ft. **Production in 1949:** 48,757 bbls; through 1949: 164,960 bbls; daily, March 1, 1950: 109 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 24-62°. **Deepest Test:** 11,541 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholder:** Union Oil of California.

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GORDON, NORTH

8 mi ne DeQuincy, Sect. 13, 14-6s-10w. **Discovery Data:** Structure by reflection seismograph. Field by Barnsdall Oil's Edgewood Land 2, completed June, 1948. **Structure:** Faulted. **Producing Formations:** Cockfield 8458-78, 8826-36 ft. **Production in 1949:** 17,568 bbls; daily, March 1, 1950: 7 bbls. **Producing Well, March 1, 1950:** 1 with no rigs running. **Gravity:** 48-54.4°. **Deepest Test:** 9300 ft in Cockfield. **Oil Outlet:** Barnsdall pipe line. **Principal Leaseholder:** Barnsdall.

HURRICANE CREEK

18 mi se DeRidder. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s Four C-McPherson 1, completed Jan. 27, 1948. **Structure:** Faulted dome. **Producing Formations:** Cockfield 8234-37, 8383-8446 ft. **Production in 1949:** 509,090 bbls; through 1949: 832,490 bbls; daily, March 1, 1950: 1709 bbls. **Producing Wells, March 1, 1950:** 20 with no rigs running. **Gravity:** 43.8-48.3°. **Deepest Test:** Magnolia's Doornbos-McPherson 1, at 9100 ft in Cook Mountain. **Oil Outlet:** Tank cars. **Principal Leaseholder:** Magnolia.

LONGVILLE

6 mi sw Longville, Sect. 1, 2, 6, 31, 36-5, 6s-9, 10w. **Discovery Data:** Structure by reflection seismograph. Field by Barnsdall Oil Co.'s Long Bell Lbr. 1, completed Dec., 1946. **Structure:** Anticline. **Producing Formations:** Cockfield 8160-8210, 8240-70 ft. **Production in 1949:** 662,724 bbls; through 1949: 1,651,202 bbls; daily, March 1, 1950: 1843 bbls. **Producing Wells, March 1, 1950:** 14 with no rigs running. **Gravity:** 49.3°. **Deepest Test:** 9200 ft in Cockfield. **Oil Outlet:** Trucks. **Principal Leaseholder:** Barnsdall Oil.

LONGVILLE, EAST

Sect. 3-6s-9w. **Discovery Data:** Field by Barnsdall Oil Co.'s M. Jones 1, completed May 17, 1949. **Producing Formations:** Cockfield 8320-36 ft. **Production in 1949:** 130,680 bbls; through 1949: 130,680 bbls; daily, March 1, 1950: 615 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 47.2°. **Deepest Test:** Discovery well at 8355 ft in Cockfield. **Oil Outlet:** Trucks. **Principal Leaseholder:** Barnsdall.

NEALE

Sect. 22, 24, 25, 26-3s-11w. **Discovery Data:** Structure by reflection seismograph, Atlantic, 1938-39. Field by Atlantic's Whitmer 1, completed March 25, 1940. **Structure:** Deep seated dome. **Producing Formations:** Wilcox 8356-11, 600 ft, 9 sands averaging 20 ft thickness. **Production in 1949:** 717,333 bbls; through 1949: 12,615,882 bbls; daily, March 1, 1950: 1710 bbls. **Producing Wells, March 1, 1950:** 47 with no rigs running. **Gravity:** 37-46°. **Deepest Test:** 12,584 ft in Wilcox. **Oil Outlet:** Atlantic pipe line to Port Arthur. **Principal Leaseholders:** Atlantic, Magnolia, Tide Water, Gulf.

ORETTA

Sect. 29, 32, 33-6s-11w. **Discovery Data:** Field by Magnolia Pet. Co.'s Musser-Davis 1, completed March 9, 1945. **Structure:** Closure against fault. **Producing Formations:** Miocene 4403-15 ft, Cockfield 8585-8656 ft. **Production in 1949:** 53,835 bbls; through 1949: 403,826 bbls; daily, March 1, 1950: 110 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 26.8-49.7°. **Deepest Test:** Magnolia's Logan et al 1, 9300 ft in Cook Mountain. **Oil Outlet:** Trucks. **Principal Leaseholder:** Magnolia. **Remarks:** Producing sand is stratigraphically at base of Cockfield immediately above Cook Mountain.

ORETTA, NORTH

2 mi n Oretta field, Sect. 22-6s-11w. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s M. J. Witzki 1, completed Jan. 24, 1946. **Structure:** Fault. **Producing Formations:** Cockfield 8422-62 ft. **Production in 1949:** 390 bbls; through 1949: 11,438 bbls; daily, March 1, 1950: None. **Producing Wells, 1950:** None with no rigs running. **Gravity:** 45.1°. **Deepest Test:** Discovery well at 8969 ft. **Oil Outlet:** Trucks. **Principal Leaseholder:** Magnolia.

PERKINS, EAST

3½ mi se DeQuincy, Sect. 34-7s-10w. **Discovery Data:** Structure by reflection seismograph. Field by Union Sulphur Co.'s W. E. McFatter 1, completed July 30, 1947. **Structure:** Probable deep seated salt dome. **Producing Formations:** Miocene 5366-77, 6495-6505, 7298-7316 ft. **Production in 1949:** 135,251 bbls; through 1949: 199,517 bbls; daily, March 1, 1950: 392 bbls. **Producing Wells, March 1, 1950:** 11 with no rigs running. **Gravity:** 29.5°. **Deepest Test:** Union Sulphur's Kelly-Weber & Co 1 at 7390 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** Union Sulphur.

PINE GROVE

Sect. 24-5s-12w. **Discovery Data:** Field by Magnolia's Lutcher-Moore 1-C, completed Feb. 2, 1945. **Structure:** Closure against fault. **Producing Formations:** Wilcox 11,343-350 ft. **Production in 1949:** None; through 1949: 1539 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 44°. **Deepest Test:** Magnolia's Lutcher-Moore 1-C to 12,640 ft in Wilcox. **Principal Leaseholders:** Magnolia, Atlantic.

SINGER

4 mi e of West Pinegrove field, Sect. 22-5s-11w. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia's Lutcher-Moore Lbr. Co. 2-C, completed Jan. 25, 1946. **Structure:** Faulted dome. **Producing Formation:** Cockfield 7630-45 ft. **Production in 1949:** 107,280 bbls; through 1949: 346,925 bbls; daily, March 1, 1950: 334 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 46.1°. **Deepest Test:** Magnolia's Lutcher-Moore 2-C, 11,625 ft in Wilcox. **Oil Outlet:** Trucks. **Principal Leaseholder:** Magnolia.

CALCASIEU PARISH

BAYOU CHOUPIQUE

4 mi sw Choupique. **Discovery Data:** Structure by reflection seismograph and surface geology. Field by Union Sulphur Co.'s Ellender 1, completed September, 1946. **Structure:** Faulted anticline. **Producing Formations:** Miocene 8593-8615 ft. **Production in 1949:** 4369 bbls; through 1949: 33,390 bbls; daily, March 1, 1950: 15 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 40.7°. **Deepest Test:** 10,365 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Union Sulphur.

BEL CITY (Distillate)

3 mi ne Holmwood, Sect. 30-10s-6w. **Discovery Data:** Structure by reflection seismograph. Field by Sohio Pet. Co.'s Sweet Lake Land & Oil Co. B-1, completed April 8, 1948. **Structure:** Fault. **Producing Formations:** Frio 10,736-50 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 48°. **Deepest Test:** Discovery well at 10,843 ft in Frio. **Principal Leaseholder:** Sohio.

BEL CITY, EAST (Distillate)

2 mi se Bel City field, Sect. 34-10s-6w. **Discovery Data:** Structure by reflection seismograph. Field by Sohio Pet. Co.'s Sweet Lake Land & Oil Co. C-1, completed May 20, 1948. **Structure:** Fault. **Producing Formations:** Frio 10,882-98 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 49.6°. **Deepest Test:** Discovery well at 12,010 ft in Frio. **Principal Leaseholder:** Sohio.

DeQUINCY

1¾ mi wsw Perkins field, Sect. 2-8s-11w. **Discovery Data:** Field by Hiloco Co.'s Industrial Lbr. Co. 2, completed Nov. 1, 1949. **Producing Formation:** Miocene 6654-64 ft. **Production in 1949:** 17,058 bbls; through 1949: 17,058 bbls; daily, March 1, 1950: 1456 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 29.5°. **Oil Outlet:** Trucks. **Principal Leaseholders:** Niloco, Shell.

EDGERLY

Sect. 20, 21, 27, 28, 29-9s-11w. **Discovery Data:** Structure by gas escapes, paraffin dirt. Field by Bright Oil Co.'s Fee 1, completed 1912. **Structure:** Piercement-type salt dome, cap rock 3958 ft, salt 3991 ft. **Producing Formations:** Miocene 3100-9325 ft (6 pays). **Production in 1949:** 153,102 bbls; through 1949: 9,534,197 bbls; daily, March 1, 1950: 384 bbls. **Producing Wells, March 1, 1950:** 16 with 1 rig running. **Gravity:** 22-32°. **Deepest Test:** Sun's Hunter Co. 2, 10,007 ft. **Oil Outlet:** Gulf 6-in to Port Arthur. **Principal Leaseholders:** Gulf, Emerson Oil Co., A. Pollard Simons Oil Co.

GILLIS—ENGLISH BAYOU

Ne of Lake Charles, Sect. 1, 11, 12, 14-9s-8w. **Discovery Data:** Structure by refraction seismograph 1928, Union Sulphur Co. then rechecked with reflection seismograph. Shell torsion balance, 1930. Gulf torsion balance, 1931. Field by Union Sulphur Co.'s Barbee Estate 2, completed Oct., 1934. **Structure:** Deep dome. **Producing Formations:** Miocene 5150-9015 ft (9 pays). **Production in 1949:** 236,016 bbls; through 1949: 23,746,511 bbls; daily, March 1, 1950: 778 bbls. **Producing Wells, March 1, 1950:** 20 with no rigs running. **Gravity:** 28-36°. **Deepest Test:** 10,690 ft in Oligocene. **Oil Outlet:** Union Sulphur Co. 6-in. **Principal Leaseholders:** Union Sulphur, Texas Gulf Prod. **Remarks:** A large graben exists between English Bayou and Gillis fields.

HAYES (Distillate)

20 mi se Lake Charles, Sect. 18-11s-5w. **Discovery Data:** Structure by reflection seismograph. Field by Gulf's Calcasieu National Bank 2, completed April 30, 1942. **Structure:** Probable deep seated salt dome. **Producing Formation:** Miocene 11,620-670 ft. **Production in 1949:** 38,633 bbls; through 1949: 140,145 bbls; daily, March 1, 1950: 103 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 44°. **Deepest Test:** 13,856 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** Gulf.

HOLMWOOD

6 mi s & w of Iowa, Sec., 25, 35, 36-10s-7w. **Discovery Data:** Structure by reflection seismograph. Field by Sohio Pet. Co.'s Farmers Land & Canal Co. 2, completed Feb. 9, 1947. **Structure:** Faulted closure. **Producing Formations:** Miocene 10,280-10,860 ft. **Production in 1949:** 465,890 bbls; through 1949: 1,099,890 bbls; daily, March 1, 1950: 1224 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 36-37.5°. **Deepest Test:** 12,001 ft in Lower Miocene. **Oil Outlet:** Continental pipe line. **Principal Leaseholders:** Sohio, Stanolind.

IOWA

16 mi e Lake Charles, Sect. 7, 8, 12, 13, 18-9s-6, 7w. **Discovery Data:** Structure by seismograph, Shell, 1929. Torsion balance, Vacuum Oil Co. Gas seepage. Field by Vacuum Oil Co.'s Wait 1, completed in Jan., 1931. **Structure:** Deep dome. **Producing Formations:** Miocene 3800-8715 (11 pays), 10,202-07 ft. **Production in 1949:** 2,213,330 bbls; through 1949: 67,293,844 bbls; daily, March 1, 1950: 5992 bbls. **Producing Wells, March 1, 1950:** 58 with 4 rigs running. **Gravity:** 30-58°. **Deepest Test:** Magnolia's Bowman 1 at 11,800 ft in salt. **Oil Outlet:** Shell 8-in to Calcasieu River then by barge. **Principal Leaseholders:** Shell, Magnolia, Barnsdall. **Remarks:** Also in Jeff Davis Parish.

LOCKPORT

Sect. 8, 9, 16, 17-9, 10s-8, 9w. **Discovery Data:** Structure by surface indications, gas escapes. Field by Vacuum Oil Co.'s Miller 1, completed Sept., 1924. **Structure:** Piercement-type salt dome. **Producing Formations:** Miocene 2200-8500 ft. **Production in 1949:** 365,790 bbls; through 1949: 17,860,929 bbls; daily, March 1, 1950: 986 bbls. **Producing Wells, March 1, 1950:** 24 with no rigs running. **Gravity:** 23-41°. **Deepest Test:** Sun's Phoenix Dev. Co. 1 at 9570 ft salt. **Oil Outlet:** Barge. **Principal Leaseholders:** Magnolia, E. J. Nicklos, Vincent & Welch, Inc.

MOSS LAKE

8 mi sw Lake Charles, Sect. 7-11s-9w. **Discovery Data:** Structure by reflection seismograph. Field by Sun Oil's Louisiana Farm & Livestock Co. 1, completed July 19, 1947. **Structure:** Faulted closure. **Producing Formations:** Miocene 8613-22, 8844-50 ft. **Production in 1949:** 10,753 bbls; through 1949: 35,047 bbls; daily, March 1, 1950: 33 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 37.5-55.1°. **Deepest Test:** Stanolind's Powell 1-A at 10,501 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Sun.

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MOSS LAKE, EAST

7 mi sw Lake Charles, Sect. 2, 3, 4, 5-11s-9w. **Discovery Data:** Structure by reflection seismograph before 1935. Field by Continental's Prairie Land & Canal Co. 1, completed May 11, 1944. **Structure:** Deep seated salt dome, faulted. **Producing Formations:** Miocene 8564-74, 10,397-440 ft. **Production in 1949:** 145,882 bbls; through 1949: 485,748 bbls; daily, March 1, 1950: 809 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 35.3-52.2°. **Deepest Test:** 11,325 ft in Vicksburg. **Oil Outlets:** Texas Co. 10-in, Continental 6-in pipe lines. **Principal Leaseholders:** Union Oil of Calif., Curtis Hankamer.

PERKINS

N of Edgewood, Sect. 32-7s-10w. **Discovery Data:** Structure by reflection seismograph, Humble, 1935. Field by Humble's Edgewood 1, completed Aug. 2, 1939. **Structure:** Deep seated dome. **Producing Formations:** Miocene 5367-85, 6674-78, 7038-60 ft. **Production in 1949:** 35,440 bbls; through 1949: 86,571 bbls; daily, March 1, 1950: 695 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 25-60°. **Deepest Test:** 9450 ft in Cockfield. **Oil Outlet:** Tank car. **Gas Outlet:** United Gas. **Principal Leaseholders:** North American Oil Consolidated, Wilcox Investment Co.

SOUTH LAKE CHARLES (Distillate)

6 mi s Lake Charles, Sect. 9-11s-8w. **Discovery Data:** Structure by reflection seismograph, Shell. Field by Continental's Glen Greathouse 1, completed Nov. 5, 1944. **Structure:** Deep seated dome. **Producing Formation:** Miocene 10,018-32 ft. **Production in 1949:** 182 bbls; through 1949: 15,169 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 53.3°. **Deepest Test:** 10,019 ft in Miocene. **Principal Leaseholders:** Continental, Gulf, Union Sulphur.

STARKS

Sect. 19, 20, 30-9s-12w. **Discovery Data:** Structure by refraction seismograph, Gulf, 1925. Field by Gulf's Lutcher-Moore 4, completed Feb., 1927. **Structure:** Piercement-type salt dome, cap rock 1228 ft, salt 2218 ft. **Producing Formations:** Cap rock and sands 525-1500 ft, Miocene and Oligocene 3025, 3422, 3721 ft, and 4100-4800, 7895-8225 ft. Average sand thickness 40 ft. Cap rock 525-75 ft, Miocene 740-8225 ft. **Production in 1949:** 154,720 bbls; through 1949: 4,508,499; daily, March 1, 1950: 488 bbls. **Producing Wells, March 1, 1950:** 30 with no rigs running. **Gravity:** 18-55°. **Deepest Test:** 11,649 ft in Vicksburg. **Oil Outlet:** Gulf 6-in. **Principal Leaseholders:** Gulf, W. T. Burton, Vincent & Welch, Inc.

SULPHUR MINES

Sect. 20, 29, 32-9s-10w. **Discovery Data:** Field by Union Sulphur Co.'s Fee 719, completed Dec. 24, 1926. **Structure:** Piercement-type salt dome, cap rock 375 ft, salt 1460 ft. **Producing Formations:** Miocene 2640-6715 ft. **Production in 1949:** 728,867 bbls; through 1949: 21,846,032 bbls; daily, March 1, 1950: 1877 bbls. **Producing Wells, March 1, 1950:** 63 with 1 rig running. **Gravity:** 17-40°. **Deepest Test:** Magnolia's Ulrich 1, 9744 ft in Miocene. **Oil Outlet:** Union Sulphur Co 6-in and 4-in (gas) pipe lines. **Principal Leaseholders:** Union Sulphur. **Remarks:** Sulphur discovered in 1868; wells listed include only tests made for oil after 700 sulphur tests were drilled. First sulphur production on coast and long world's most important supply, yielding 10,000,000 long tons, 1903-1924. Frasch method of extracting sulphur from cap rock was perfected here.

VINTON

Sect. 3, 4-11s-12w; 26, 32, 33, 34, 35, 36-10s-12w. **Discovery Data:** Structure by oil and gas seeps, surface elevations. Field by Sabine Oil & Mineral Co.'s Johnson-Vincent 1, completed June 25, 1910. **Structure:** Piercement-type salt dome, cap rock 428 ft, salt 925 ft. **Producing Formations:** Miocene 1850-6080 ft (10 pays). **Production in 1949:** 3,739,612 bbls; through 1949: 64,091,226 bbls; daily, March 1, 1950: 11,563 bbls. **Producing Wells, March 1, 1950:** 120 with no rigs running. **Gravity:** 22-40°. **Deepest Test:** Cox & Hamon's J. Jardell 1 at 9050 ft in salt. **Oil Outlets:** Gulf and Sun pipe lines. **Principal Leaseholders:** Gulf, Vinton Pet. Co., Wilson-Broach Co., Cox & Hamon, Walter D. Cline, Jr.

CAMERON PARISH

BIG LAKE

Sect. 13, 18-12s-7, 8w. **Discovery Data:** Structure by Magnolia's reflection seismograph in 1934. Field by Magnolia's Broussard 1, completed Dec. 24, 1935 (gas). **Structure:** Probable deep seated dome. **Producing Formation:** Miocene 8571-9060 ft. **Production in 1949:** 11,080 bbls; through 1949: 106,743 bbls; daily, March 1, 1950: 14 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 39-52°. **Deepest Test:** 13,084 ft in Miocene. **Oil Outlet:** Barge to Lake Charles. **Principal Leaseholder:** Continental Oil Co. **Remarks:** Oil was discovered by Union Sulphur Co.'s Herbert 1, May, 1937.

BLACK BAYOU

Sect. 7, 8, 17, 18-12s-12w. **Discovery Data:** Structure by surface indications. Seismograph by Shell, 1927. Field by Shell's Watkins 9, completed April 5, 1929. **Structure:** Piercement-type salt dome, cap rock 884 ft, salt 1701 ft. **Producing Formations:** Miocene 4190-8570 ft (8 pays). **Production in 1949:** 766,122 bbls; through 1949: 15,602,749 bbls; daily, March 1, 1950: 2225 bbls. **Producing Wells, March 1, 1950:** 25 with no rigs running. **Gravity:** 22-45°. **Deepest Test:** Stanolind's W. E. Lea 1, at 10,533 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Shell, Stanolind.

BLOCK 33

2½ mi offshore in Gulf of Mexico. **Discovery Data:** Field by Kerr-McGee's State 1123-1A, completed Aug. 24, 1949. **Producing Formations:** Miocene 10,390-408 ft. **Production in 1949:** 19,613 bbls; through 1949: 19,613 bbls; daily, March 1, 1950: 43 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 42.3°. **Deepest Test:** Discovery well at 13,282 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Kerr-McGee.

CAMERON MEADOWS

Sect. 15, 16, 21-14s-13w. **Discovery Data:** Structure by seismograph and torsion balance, Vacuum Oil Co., 1929. Field by Vacuum's Cameron Meadow 1, completed Jan. 20, 1931. **Structure:** Salt dome, salt 6200 ft. **Producing Formations:** Pliocene 1338-68 ft, Miocene 3080-8530 ft (9 pays). **Production in 1949:** 237,802 bbls; through 1949: 12,730,064 bbls; daily, March 1, 1950: 584 bbls. **Producing Wells, March 1, 1950:** 24 with no rigs running. **Gravity:** 20-42°. **Deepest Test:** Magnolia's Cameron Meadow 42, 10,415 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Burton-Sutton Oil Co., Magnolia, Texas Co.

CAMERON MEADOWS, EAST (Gas).

12 mi w&n Cameron, Sect. 13-14s-12w. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s Miami Corp. 4, completed Sept. 27, 1947. **Structure:** Deep seated salt dome. **Producing Formation:** Miocene 4492-96 ft. **Deepest Test:** Discovery well at 11,669 ft in Miocene. **Principal Leaseholder:** The Texas Co.

CHALKLEY

Ne of Sweet Lake, Sect. 5, 8, 9, 16, 17, 21-12s-6w. **Discovery Data:** Structure by reflection seismograph and torsion balance, Shell, Humble, 1934-37. Field by Humble's School Land 1, completed Feb. 19, 1934. **Structure:** Probable deep dome. **Producing Formations:** Miocene 7134-10,134 ft (6 pays). **Production in 1949:** 392,223 bbls; through 1949: 11,808,673 bbls; daily, March 1, 1950: 1193 bbls. **Producing Wells, March 1, 1950:** 24 with no rigs running. **Gravity:** 36-37°. **Deepest Test:** 11,693 ft in Miocene. **Oil Outlet:** Barge. **Gas Outlet:** Delta pipe line 8-in. **Principal Leaseholders:** Humble, Shell.

CREOLE

1 mi offshore in Gulf of Mexico, Sect. 4-15s-8w. **Discovery Data:** Structure by reflection seismograph, Superior, Pure, 1933, 1934. Field by Superior and Pure's State 1, completed Jan. 11, 1938. **Structure:** Deep seated salt dome. **Producing Formation:** Miocene 5110-40 ft. **Production in 1949:** 121,723 bbls; through 1949: 3,040,036 bbls; daily, March 1, 1950: 299 bbls. **Producing Wells, March 1, 1950:** 8 with no rigs running. **Gravity:** 34°. **Deepest Test:** 10,112 ft in Miocene. **Oil Outlet:** Pure 8-in. **Principal Leaseholders:** Superior and Pure. **Remarks:** First La. oil field in Gulf of Mexico. Wells drilled directionally from center platform.

GRAND CHENIER (Distillate)

7 mi e Grand Chenier, Sect. 1-15s-5w. **Discovery Data:** Structure by reflection seismograph. Field by Sohio Pet. Co.'s Charles Richard 1, completed April 28, 1947. **Structure:** Faulted closure. **Producing Formations:** Miocene 8380-90 ft. **Production in 1949:** None; through 1949: none; daily, March 1, 1950: 10 bbls. **Producing Wells, March 1, 1950:** 1 with 1 rig running. **Gravity:** Dist. **Deepest Test:** Discovery well at 11,020 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholders:** Sohio, Sun.

GRAND LAKE

In Grand Lake, Sect. 11, 14-13s-4w. **Discovery Data:** Structure by reflection seismograph, 1938. Field by Superior's State 1, completed May 6, 1939. **Structure:** Deep dome. **Producing Formations:** Miocene 8266-8944 ft (4 pays). **Production in 1949:** 559,438 bbls; through 1949: 9,407,966 bbls; daily, March 1, 1950: 1571 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 32°. **Deepest Test:** 11,386 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Superior, Amerada.

GUM COVE

3½ mi e Black Bayou field, Sect. 13-12s-12w. **Discovery Data:** Structure by reflection seismograph, Magnolia, 1942. Field by Magnolia's R. A. Moore 2-A, completed Feb. 24, 1944. **Structure:** Deep seated, faulted dome. **Producing Formations:** Lower Miocene 9140-50 ft, Miocene 9545-51, 9638-53 ft. **Production in 1949:** 14,017 bbls; through 1949: 175,508 bbls; daily, March 1, 1950: 31 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 55°. **Deepest Test:** 10,808 ft in Hackberry. **Oil Outlet:** Barge. **Principal Leaseholder:** Magnolia.

HACKBERRY, EAST

Sect. 46-12s-9w, 11, 12, 13, 14, 17, 19, 24, 27, 36, 37-12s-10w. **Discovery Data:** Structure by surface indications of gas seeps and by refraction seismograph. Calcasieu Oil Co., 1926. Field by Calcasieu's Caldwell 2, completed Nov., 1927. **Structure:** Salt dome, salt 3588 ft. **Producing Formation:** Miocene 2700-10,800 ft (15 pays). **Production in 1949:** 1,487,167 bbls; through 1949: 43,350,370 bbls; daily, March 1, 1950: 3792 bbls. **Producing Wells, March 1, 1950:** 61 with no rigs running. **Gravity:** 27-33°. **Deepest Test:** 12,038 ft in Miocene. **Oil Outlets:** Barge, Gulf 6-in pipe line. **Principal Leaseholders:** Union Sulphur, The Texas Co., Magnolia, Stanolind, Gulf.

HACKBERRY, WEST

Sect. 16, 17, 19, 20, 21, 22, 23, 27, 28, 29, 30, 31-12s-10w. **Discovery Data:** Surface indications of elevation, gas seeps, paraffin dirt. Cameron Oil Co.-Rycade Oil Corp.'s Duhon 1, completed Dec. 1, 1928. **Structure:** Salt dome, cap rock 1650 ft, salt 2078 ft. **Producing Formation:** Miocene 3095-9813 ft (24 pays). **Production in 1949:** 2,137,330 bbls; through 1949: 27,566,733 bbls; daily, March 1, 1950: 6210 bbls. **Producing Wells, March 1, 1950:** 71 with 1 rig running. **Gravity:** 21-31° **Deepest Test:** 10,938 ft in Miocene. **Oil Outlets:** Barge and Sun 4-in pipe line. **Principal Leaseholders:** Stanolind, Sutton Oil Co., W. T. Burton, Superior. **Remarks:** This is considered a twin dome with East Hackberry being the w uplift of a salt mass underlying both fields.

HOG BAYOU (Gas)

3 mi s of Grand Chenier, Sect. 22-15s-6w. **Discovery Data:** Field by Sohio Pet. Co.'s Sweeney-Miller 1, completed Oct. 23, 1948. **Producing Formations:** Miocene 8250-75 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Deepest Test:** Discovery well at 13,067 ft in Miocene. **Principal Leaseholder:** Sohio.

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HOLLY BEACH (Distillate)

12 mi sw of Creole, Sect. 7-15s-10w. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s Abel West Heirs 1, completed May, 1948. **Structure:** Salt dome. **Producing Formation:** Miocene 10,817-822 ft. **Production in 1949:** 2097 bbls; through 1949: 2097 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 53.2°. **Deepest Test:** Discovery well at 11,630 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** Magnolia.

JOHNSON BAYOU (Distillate)

5 mi w of Johnson Bayou, Twp. 14s-15w. **Discovery Data:** Structure by reflection seismograph and subsurface geology. Field by Continental & Yegua Corp.'s Cameron Parish School Board 1, completed April, 1946. **Structure:** Faulted anticline. **Producing Formations:** Miocene 4480-95, 9166-82 ft. **Production in 1949:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 50°. **Deepest Test:** Discovery well at 9637 ft in Miocene. **Principal Leaseholders:** Continental & Yegua, Stanolind, Gulf, Humble.

LAKESIDE (Lowry) (Distillate)

Sect. 19, nw of Grand Lake field. **Discovery Data:** Structure by geophysics. Field by Lisbon-Iberia Oil Corp.'s Calcasieu National Bank 1, completed Feb. 24, 1941. **Structure:** Deep seated salt dome. **Producing Formations:** Lower Miocene 9820-10,060 ft (4 pays). **Production in 1949:** 98,232 bbls; through 1949: 385,740 bbls; daily, March 1, 1950: 228 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 50°. **Deepest Test:** 11,059 ft in Miocene. **Oil Outlet:** Barge. **Gas Outlet:** Delta 10-in pipe line. **Principal Leaseholder:** Superior, Lisbon-Iberia, Pure.

LITTLE CHENIERE

8 mi e of Creole, Sect. 11, 14-14s-6w. **Discovery Data:** Structure by reflection seismograph. Field by Phillips Pet. Co.'s Miami Corp. 1, completed July 11, 1940. **Structure:** Probable deep seated salt dome. **Producing Formations:** Miocene 10,196-207, 10,422-28 ft. **Production in 1949:** 1295 bbls; through 1949: 13,497 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with 1 rig running. **Gravity:** 37.2-47°. **Deepest Test:** Gulf's Mermentan Mining & Ld. Co. 1, at 13,260 ft in Miocene. **Principal Leaseholders:** Phillips, Gulf. **Remarks:** Deepest test opened crude production in this shut in distillate field.

MALLARD BAY

Sect. 14-14s-6w. **Discovery Data:** Field by Cecil Hagen Co.'s A. E. White 1, completed April 26, 1949. **Producing Formations:** Miocene 6715-44 ft. **Production in 1949:** 20,469 bbls; through 1949: 20,469 bbls; daily, March 1, 1950: 79 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 39.7°. **Deepest Test:** Discovery well at 10,642 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** Martex Realization Corp.

MUD LAKE (Distillate)

Sect. 32-14s-11w. **Discovery Data:** Field by Magnolia's Lutcher A-1, completed Oct. 18, 1945. **Structure:** Faulted nose. **Producing Formations:** Hackberry 9640-50, 10,652-660 ft. **Production in 1949:** 27 bbls; through 1949: 9022 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 60°. **Deepest Test:** 11,932 ft in Miocene. **Oil Outlet:** Truck. **Principal Leaseholders:** Magnolia, Texas Co.

MUD LAKE, EAST

2¼ mi ne Mud Lake field, Sect. 24-14s-11w. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s Lutcher-Moore C-1, completed March 28, 1947. **Structure:** Salt dome. **Producing Formations:** Miocene 10,750-11,416 ft (5 pays). **Production in 1949:** 31,971 bbls; through 1949: 54,271 bbls; daily, March 1, 1950: 37 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 43.3°. **Deepest Test:** Magnolia's Lutcher-Moore C-3 at 11,913 ft in Miocene. **Oil Outlet:** Truck. **Principal Leaseholder:** Magnolia.

PECAN LAKE (Distillate)

10 mi s Grand Lake field. **Discovery Data:** Structure by reflection seismograph. Field by Superior Oil Co.'s Miami Corp. 1-B, completed May 15, 1941. **Structure:** Deep seated closure on all sides. **Producing Formations:** Miocene 8193-10,502 ft (3 pays). **Production in 1949:** 1424 bbls; through 1949: 15,139 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 46°. **Deepest Test:** 11,020 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Superior.

SWEET LAKE

Sect. 12-13s-8w. **Discovery Data:** Structure by surface indications, gas seepages. Field by Pure's Sweet Lake 1, completed Oct., 1926. **Structure:** Probable deep dome. **Producing Formations:** Miocene 4457-7334 ft (7 pays). **Production in 1949:** 413,928 bbls; through 1949: 10,025,246 bbls; daily, March 1, 1950: 1044 bbls. **Producing Wells, March 1, 1950:** 16 with no rigs running. **Gravity:** 30°. **Deepest Test:** 9179 ft in Miocene. **Oil Outlet:** Pure 8-in pipe line. **Principal Leaseholder:** Pure.

"WEST CAMERON BLOCK 45" (Distillate)

W. Cameron area, Block 45, in Gulf of Mexico. **Discovery Data:** Field by Stanolind O&G Co., State Lease 1133-1, completed May 21, 1949. **Structure:** Salt dome. **Producing Formations:** Miocene 8738-48 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 51.5°. **Deepest Test:** Discovery well at 8814 ft in Miocene. **Principal Leaseholder:** Stanolind.

"WEST CAMERON BLOCK 149" (Distillate)

W. Cameron area, Block 149, in Gulf of Mexico. **Discovery Data:** Field by Superior Oil Co.'s State B.-Lse. 1-A, completed July 16, 1949. **Structure:** Salt dome. **Producing Formations:** Miocene 7150-60 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 43.5°. **Deepest Test:** Discovery well at 9380 ft in Miocene. **Principal Leaseholder:** Superior.

EAST BATON ROUGE PARISH

HOPE VILLA

13 mi se Baton Rouge, Sect. 44-8s-2e. **Discovery Data:** Structure by reflection seismograph, 1941. Field by Shamrock Oil Co.'s L. P. Phillips 1, completed Sept. 4, 1943. **Structure:** Faulted anticline. **Producing Formation:** Frio 9568-75 ft. **Production in 1949:** 841 bbls. through 1949: 36,872 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 45°. **Deepest Test:** Ohio Oil Co.'s Denham 1, 10,302 ft in Oligocene. **Oil Outlet:** Truck to Baton Rouge. **Principal Leaseholders:** Ohio, Gulf, Superior, Amerada.

UNIVERSITY (Baton Rouge)

Sect. 30, 36, 45, 46, 65, 66, 67, 68-7s-1w; 41, 68-8s-1w. **Discovery Data:** Structure by torsion balance, 1933. Worked by reflection seismograph, Hoard Exploration Co., 1935, for Superior Oil Co. Field by Louisiana Crusader and William Helis' Duplentier 1, completed Jan. 21, 1938. **Structure:** Dome. **Producing Formations:** Miocene 7150-8200 ft (3 pays), Frio 9225-9961 ft (5 pays). **Production in 1949:** 2,845,249 bbls; through 1949: 26,954,262 bbls; daily, March 1, 1950: 8369 bbls. **Producing Wells, March 1, 1950:** 84 with no rigs running. **Gravity:** 36-52°. **Deepest Test:** 10,360 ft in Chickasahway. **Oil Outlets:** Grubb & Hawkins, Sun pipe lines. **Gas Outlet:** Interstate Natural Gas 6-in. **Principal Leaseholders:** William Helis, Sugar Field Oil Co., T. G. Markley, A. J. Bankhead, Crosby Drlg., Grubb & Hawkins, Floyd C. Karsten.

EVANGELINE PARISH

DURALDE

8 mi sw Reddell field, Sect. 31-5s-2w. **Discovery Data:** Field by S. W. Richardson's Ada M. Soileau 1, completed May 13, 1949. **Producing Formations:** Wilcox 11,304-16 ft. **Production in 1949:** 3687 bbls; through 1949: 3687 bbls; daily, March 1, 1950: 10 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Deepest Test:** Discovery well at 12,832. **Oil Outlet:** Truck. **Principal Leaseholder:** Sid W. Richardson.

MAMOU

3 mi e of Pine Prairie field, Sect. 5-5s-1e. **Discovery Data:** Field by Magnolia Pet. Co.'s J. B. Morein 1, completed Dec. 29, 1945. **Structure:** Anticline faulted with production on down throw side. **Producing Formations:** Wilcox 11,510-533, 11,761-93 ft. **Production in 1949:** 335,608 bbls; daily, March 1, 1950: 815 bbls. **Producing Wells, March 1, 1950:** 17 with no rigs running. **Gravity:** 46.3°. **Deepest Test:** 13,800 ft in Wilcox. **Oil Outlet:** Continental pipe line. **Principal Leaseholder:** Magnolia.

PINE PRAIRIE

Sect. 23, 26, 35, 36, 37-3s-1w; 2-4s-1w. **Discovery Data:** Structure by surface indications, outcrop of cap rock. Field by Myles Mineral Co.'s Fee 8, completed 1912. **Structure:** Piercement-type salt dome, cap rock at surface, salt 516 ft. **Producing Formations:** Miocene 1904-2933 ft, Cockfield 7530-8236 ft, Sparta 8600-8870 ft, Wilcox 9630-10,539 ft. **Production in 1949:** 1,421,713 bbls; through 1949: 12,605,574 bbls; daily, March 1, 1950: 3002 bbls. **Producing Wells, March 1, 1950:** 69 with 1 rig running. **Gravity:** 25.8-47°. **Deepest Test:** 11,694 ft in Wilcox. **Oil Outlet:** Interstate pipe line to Baton Rouge. **Principal Leaseholders:** Stanolind, Pan American, Gulf, Humble. **Remarks:** Cap rock quarried from this dome. In April, 1941, C. & I. Production Co. opened first big production in Evangeline Land & Mineral Co. 1, perforated at 8189-8236 ft, flowing 812 bbls on ¼-in choke.

REDDELL (Distillate)

6 mi nw Mamou, Sect. 9, 17, 18, 19, 20, 29, 32-4s-1w. **Discovery Data:** Structure discovered by torsion balance and reflection seismograph surveys in early 1930's. Field by Continental's Pardee Co. 3, completed Nov. 14, 1943. **Structure:** Deep seated, faulted dome. **Producing Formations:** Sparta, 9600-10,020 ft. **Production in 1949:** 359,248 bbls; daily, March 1, 1950: 661 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 55.6-56.8°. **Deepest Test:** 12,206 ft in Wilcox. **Oil Outlet:** Continental pipe line to Baton Rouge. **Principal Leaseholders:** Continental, Humble, Tide Water.

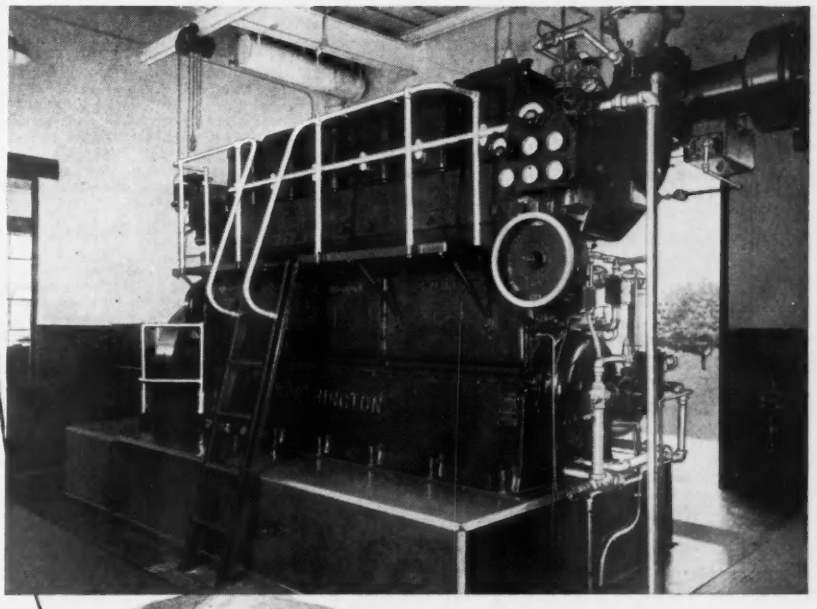
VILLE PLATTE

6 mi n Ville Platte, Sect. 27, 36, 44, 45, 46, 47-3s-2e. **Discovery Data:** Structure by reflection seismograph and torsion balance, Continental, 1936. Field by Continental's Tate 1, completed Sept. 17, 1937. **Structure:** Deep seated dome. **Producing Formations:** Sparta 8900-9100 ft, Wilcox 9900-10,400 ft. **Production in 1949:** 1,968,399 bbls; through 1949: 41,916,745 bbls; daily, March 1, 1950: 5474 bbls. **Producing Wells, March 1, 1950:** 236 with no rigs running. **Gravity:** 36-60°. **Deepest Test:** 12,528 ft in Wilcox. **Oil Outlet:** Continental 8-in. **Gas Outlet:** Continental 6-in. **Principal Leaseholders:** Continental, Amerada, J. D. Hughes Oil Co., Danciger, The Texas Co.

IBERIA PARISH

AVERY ISLAND

10 mi sw New Iberia, Sect. 23, 25, 26, 37-13s-5e. **Discovery Data:** Structure by surface elevation, brine springs and gas seeps. Field by Humble's Petit Anse Co. 2, completed Aug. 1, 1942. **Structure:** Piercement-type salt dome. **Producing Formations:** Miocene 7274-10,100 ft (7 pays). **Production in 1949:** 2,377,647 bbls; through 1949: 9,018,975 bbls; daily, March 1, 1950: 7251 bbls. **Producing Wells, March 1, 1950:** 34 with 1 rig running. **Gravity:** 32-43°. **Deepest Test:** Humble's Petit Anse Co. 14 at 12,981 ft in Miocene. **Oil Outlet:** The Texas Co. 4-in. **Gas Outlet:** United Gas 4-in. **Principal Leaseholder:** Humble. **Remarks:** This island has surface elevation 152 ft above the marshes. Rock salt found 8 ft below surface in 1862. Salt taken from springs here first in 1812. Mining started in 1862.



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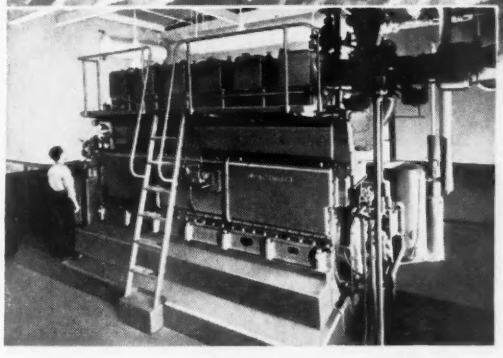

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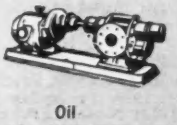

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Cooling Water Circulating Pumps

Evaporative Type Engine Water Cool.

BAYOU PIGEON

Sect. 13-10s-12e. **Discovery Data:** Structure by reflection seismograph, Shell, 1936. Field by Plymouth Oil Co.'s McHugh 1, completed March 19, 1940. **Structure:** Probable deep seated dome. **Producing Formations:** Miocene 8052-72, 8130-55 ft. Average sand thickness, 18 ft. **Production in 1949:** 153,589 bbls; through 1949: 1,602,022 bbls; daily, March 1, 1950: 498 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 27°. **Deepest Test:** 12,300 ft in Miocene. **Oil Outlet:** Barge to Republic's Texas City refinery. **Principal Leaseholder:** Plymouth.

EUGENE ISLAND BLOCK 45 (Distillate)

12 mi in Gulf of Mexico, Block 45. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s State Lse. 838-1, completed Nov., 1948. **Structure:** Salt dome. **Producing Formation:** Miocene 11,351-58 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 45.5°. **Deepest Test:** Discovery well at 13,636 ft in Miocene. **Principal Leaseholder:** Magnolia.

EUGENE ISLAND BLOCK 110 (Distillate)

27 mi in Gulf of Mexico, Block 110. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Pet. Co.'s State Lse. 686-1, Completed July 12, 1949. **Structure:** Salt dome. **Producing Formation:** Miocene 7159-60. **Production:** Shut in since discovery. **Producing wells, March 1, 1950:** None with no rigs running. **Gravity:** 53.6°. **Deepest Test:** Discovery well at 12,067 ft in Miocene. **Principal Leaseholder:** Magnolia.

FAUSSE POINT

Sect. 26, 27, 34, 35-11s-8e. **Discovery Data:** Structure by refraction seismograph, Gulf, 1926. Field by Union Sulphur Co.'s Shaw 1, completed Feb., 1927. **Structure:** Piercement-type salt dome, cap rock 800 ft, salt 850 ft. **Producing Formations:** Miocene 4980-8800 ft (6 pays). **Production in 1949:** 345,665 bbls; through 1949: 2,618,144 bbls; daily, March 1, 1950: 878 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 31-50°. **Deepest Test:** 13,122 ft in Miocene. **Oil Outlet:** Texas Co. 6-in pipe line. **Principal Leaseholder:** Texas Co. **Remarks:** Also in St. Martin Parish.

IBERIA

Twp. 12s-7e. **Discovery Data:** Structure by elevation, gas seepages, paraffin beds. Field by Gulf and New Iberia Oil Co.'s Boliver 1, completed Feb., 1917. **Structure:** Piercement-type salt dome, salt 805 ft. **Producing Formations:** Pliocene-Miocene from 800-11,010 ft, 24 sands averaging 50-ft thickness. **Production in 1949:** 1,573,557 bbls; through 1949: 40,625,032 bbls; daily, March 1, 1950: 4184 bbls. **Producing Wells, March 1, 1950:** 61 with no rigs running. **Gravity:** 18-24°. **Deepest Test:** 11,892 ft in Miocene. **Oil Outlets:** Canal Oil Co.'s 6-in to terminal. Interstate 6-in, Texas 6-in, William Helis 6-in to Bayou Teche, barge. **Principal Leaseholders:** Texas Co., Wm. Helis, Grubbs & Hawkins. **Remarks:** Was known as Little Bayou. Includes Iberia distillate field discovered by Humble's Mayon Romero 1, Dec. 27, 1945.

JEFFERSON ISLAND

Immediate area of Lake Piegneur, Sect. 58-12s-5e. **Discovery Data:** Structure by elevation, rock salt 334 ft found by Joe Jefferson, 1895. Texas Co. outlined structure with reflection seismograph, 1937. Several deep wells drilled by Jefferson Lake Oil Co. showed oil but first commercial producer was Texas Co.'s Bayless & Jones 1, completed June 14, 1938. **Structure:** Piercement-type salt dome, cap rock 78 ft, salt 80 ft, east flank salt 8683 ft. **Producing Formations:** Miocene 3075-9517 ft. **Production in 1949:** 97,227 bbls; through 1949: 2,229,452 bbls; daily, March 1, 1950: 284 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 33-36°. **Deepest Test:** 12,217 ft in Miocene. **Oil Outlet:** Texas Co. 6-in. **Gas Outlet:** United Gas 6-in. **Principal Leaseholder:** Texas Co. **Remarks:** Also in Vermilion Parish. Sulphur produced here until 1936.

LAKE SAND (Distillate)

State Lse. 1706 in Cote Blanche Bay. **Discovery Data:** Field by Humble O&R Co.'s St. Lse. 1706-W, Cote Blanche Bay 1, completed Dec. 30, 1949. **Producing Formation:** Miocene 10,005-10 ft. **Production in 1949:** None; through 1949: None; daily, March 1, 1950: 5 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** Dist. **Deepest Test:** Discovery well at 13,050 ft in Miocene. **Oil Outlet:** Truck. **Principal Leaseholder:** Humble.

RABBIT ISLAND

Twp. 19s-9e in Gulf of Mexico. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s State-Rabbit Island 3, completed June 17, 1942. **Structure:** Deep seated dome. **Producing Formations:** Miocene 8668-12,446 ft (3 pays). **Production in 1949:** 26,482 bbls; through 1949: 27,208 bbls; daily, March 1, 1950: 447 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 36.5°-dist. **Deepest Test:** Texas Co.'s State-Rabbit Island 11, at 12,656 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co. **Remarks:** Originally a distillate field. Crude production opened Dec., 1949.

TIGRE LAGOON

4 mi w Avery Isle, Sect. 29-13s-5e. **Discovery Data:** Structure by refection seismograph. Field by Union of California's P. O. Landry 1, completed April 25, 1947. **Structure:** Deep salt dome. **Producing Formations:** Miocene 10,470-75, 10,638-11,660 ft (3 pays). **Production in 1949:** 119,256 bbls; through 1949: 136,050 bbls; daily, March 1, 1950: 689 bbls. **Producing Wells, March 1, 1950:** 3 with no rig running. **Gravity:** 54°. **Deepest Test:** 12,226 ft in Miocene. **Oil Outlet:** Barge to Gulf to Port Arthur. **Principal Leaseholder:** Union of Calif.

TIGRE LAGOON, SOUTH (Distillate)

In Vermilion Bay, Twp. 14s-5e. **Discovery Data:** Field by Union of Calif.'s State Lse. 1700-1, completed Sept. 25, 1949. **Producing Formations:** Miocene 11,400-15 ft. **Production in 1949:** None; through 1949: None; daily, March 1, 1950: 10 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 47°. **Deepest Test:** Discovery well at 11,761 ft in Miocene. **Principal Leaseholder:** Union of Calif.

VERMILION BAY

In Vermilion Bay, Twp. 16s-6e. **Discovery Data:** Structure by reflection seismograph, Louisiana L&E Co., 1927. Field by Texas Co.'s State B-3, completed July 23, 1939. **Structure:** Piercement-type salt dome, cap rock 787 ft, salt 796. **Producing Formations:** Miocene 9300-10,775 ft (3 pays). **Production in 1949:** 23,573 bbls; through 1949: 750,860 bbls; daily, March 1, 1950: 45 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 35-50°. **Deepest Test:** 13,095 ft in Miocene. **Oil Outlets:** Barge and Texas Co. 4-in pipe line. **Principal Leaseholder:** The Texas Co.

WEEKS ISLAND

12 mi s New Iberia, Twps. 14s-6, 7e. **Discovery Data:** Structure discovered in 1897 by surface indications. Field by Shell Oil Co.'s Smith-State 1, completed May 9, 1945. **Structure:** Piercement-type salt dome. **Producing Formations:** Miocene 13,505-520; 13,763-778 ft; 7968-14,255 (12 pays). **Production in 1949:** 2,933,777 bbls; daily, March 1, 1950: 12,441 bbls. **Producing Wells, March 1, 1950:** 37 with 3 rigs running. **Gravity:** 30-40°. **Deepest Test:** Shell's J. A. Smith 1-A at 15,094 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Shell, Gulf, Humble. **Remarks:** One of the deepest producing fields in the world.

IBERVILLE PARISH

BAYOU BLEU

Sect. 66, 67, 68, 72-9s-11e; 68, 74, 75-9s-10e. **Discovery Data:** Structure by refraction seismograph, Calcasieu Oil Co., 1926. Field by Standard Oil Co. of La.'s Wilbert 3, completed Sept. 10, 1929. **Structure:** Piercement-type salt dome, cap rock 2792 ft, salt 2802 ft. **Producing Formations:** Miocene 1246-7400 ft (14 pays). **Production in 1949:** 807,216 bbls; through 1949: 6,589,848 bbls; daily, March 1, 1950: 2991 bbls. **Producing Wells, March 1, 1950:** 50 with no rigs running. **Gravity:** 19-38°. **Deepest Test:** Stanolind's Wilbert Mineral Corp. 1-B at 12,366 ft in Chickasahway. **Oil Outlet:** Barge to Baton Rouge and New Orleans. **Principal Leaseholders:** Superior, Continental, T. G. Markley et al.

BAYOU CHOCTAW

Sect. 52, 53-9s-11e, 29-8s-11e. **Discovery Data:** Structure by refraction seismograph, Gulf, 1926. Field by Standard Oil Co. of La.'s Gay 1, completed June 22, 1931. **Structure:** Piercement-type salt dome, cap rock 415 ft, salt 667 ft. **Producing Formations:** Miocene 2358-4833 ft. 7 sands averaging 30 ft thickness. 2358-7,960 ft (14 pays). **Production in 1949:** 189,640 bbls; through 1949: 4,981,846 bbls; daily, March 1, 1950: 513 bbls. **Producing Wells, March 1, 1950:** 15 with no rigs running. **Gravity:** 26-37°. **Deepest Test:** 12,200 ft in Miocene. **Oil Outlet:** Interstate Standard pipe line to Baton Rouge. **Principal Leaseholders:** Texas Co., Carter Oil Co., with sulphur rights sub-leased to Texas Gulf Sulphur Co. **Remarks:** Also in West Baton Rouge Parish.

BAYOU DES GLAISE

10 mi sw Rosedale, Sect. 77, 78, 79, 85, 86-8s-8e. **Discovery Data:** Structure by refraction seismograph, Calcasieu Oil Co., 1926. Field by Humble's Wilberts B-2, completed in 1940. **Structure:** Piercement-type salt dome, cap rock 3478 ft, salt 3697 ft. **Producing Formations:** Miocene 9779-10,354 ft (3 pays). **Production in 1949:** 473,879 bbls; through 1949: 1,664,751 bbls; daily, March 1, 1950: 1027 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 35-37°. **Deepest Test:** Humble's Schwing et al 4-B at 12,433 ft in Marginulina. **Oil Outlet:** Barge to Baton Rouge. **Principal Leaseholders:** Humble, Shell, Texas Co. **Remarks:** The discovery well produced for three months in 1940 and was abandoned. Humble's Wilberts B-4 reopened production in May, 1944.

LAUREL RIDGE (Distillate)

Sect. 91-10s-13e, 3 mi se White Castle. **Discovery Data:** Structure by reflection seismograph in 1941. Field by Humble's Adam Hymel 1, completed July 3, 1944. **Structure:** Deep seated, faulted dome. **Producing Formation:** Miocene 10,688-711 ft. **Production in 1949:** 23,852 bbls; through 1949: 66,224 bbls; daily, March 1, 1950: 20 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 50°. **Deepest Test:** 11,195 ft in Miocene. **Oil Outlet:** Truck. **Principal Leaseholder:** Humble.

ROSEDALE

2½ mi sw Rosedale, Sect. 74-7s-10e. **Discovery Data:** Structure by reflection seismograph prior to 1934. Field by Sugar Field Oil Co.'s Iberville Mortgage and Loan Co. 1, completed Oct. 28, 1943. **Structure:** Fault. **Producing Formations:** Lower Miocene 10,006-016, 10,230-240 ft. **Production in 1949:** 78,984 bbls; through 1949: 626,914 bbls; daily, March 1, 1950: 186 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 34°. **Deepest Test:** 11,456 ft in Cockfield. **Oil Outlet:** Truck. **Principal Leaseholder:** Sugar Field Oil Co.

ST. GABRIEL

4½ mi w of Prairieville. **Discovery Data:** Structure by reflection seismograph. Field by Titanic Oil Co.'s Natalbany 1, completed Feb. 19, 1941. **Structure:** Deep seated, faulted dome. **Producing Formations:** Miocene 7750-11,045 ft (6 pays). **Production in 1949:** 1,531,638 bbls; through 1949: 14,269,536 bbls; daily, March 1, 1950: 4417 bbls. **Producing Wells, March 1, 1950:** 37 with 1 rig running. **Gravity:** 33°. **Deepest Test:** 12,331 ft in Marginulina. **Oil Outlets:** Shell pipe line and barge to Shell Norco and Standard Baton Rouge refineries. **Principal Leaseholders:** Shell, Gravis & Mitchell. **Remarks:** Also in Ascension Parish. Includes St. Gabriel, South, field discovered Aug. 25, 1945, by Noble & Baker's Caldwell 1.

SUNSHINE

8 mi wnw St. Gabriel field. **Discovery Data:** Structure by reflection seismograph. Field by Sohio Pet. Co.'s Nelson B-1, completed Nov. 23, 1948. **Structure:** Deep salt dome. **Producing Formation:** Miocene 10,306-15 ft. **Production in 1949:** 155,278 bbls; through 1949: 156,795 bbls; daily, March 1, 1950: 1141 bbls. **Producing Wells, March 1, 1950:** 8 with 1 rig running. **Gravity:** 29.4°. **Deepest Test:** Discovery well at 11,023 ft in Miocene. **Oil Outlet:** Trucked to St. Gabriel and thence barged to Norco refinery. **Principal Leaseholders:** Sinclair, Sohio.

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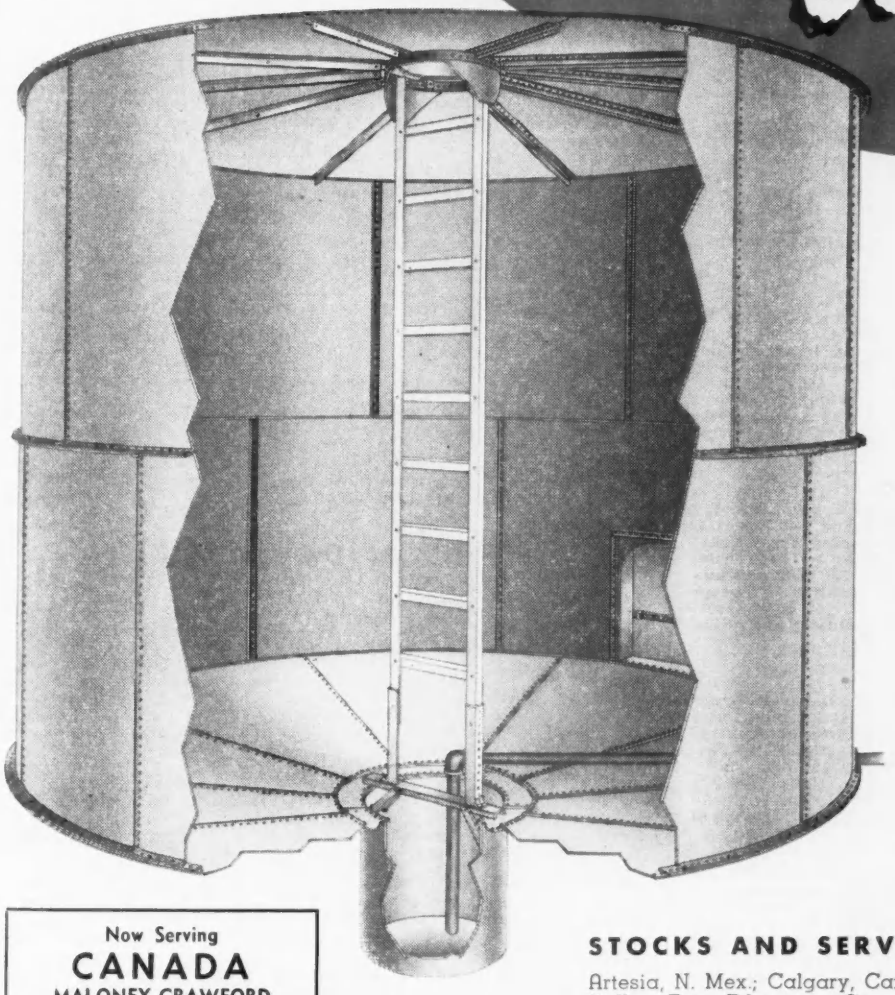

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WHITE CASTLE

Sect. 1, 2, 3, 8, 9, 12-11s-12e. **Discovery Data:** Structure by refraction seismograph, Shell, 1926. Field by Shell's Wilbert 3, completed in Oct., 1929. **Structure:** Piercement-type salt dome, cap rock 1810 ft, salt 2313 ft. **Producing Formations:** Miocene 3740-8775 ft (8 pays). **Production in 1949:** 1,596,754 bbls; through 1949: 15,550,965 bbls; daily, March 1, 1950: 4967 bbls. **Producing Wells, March 1, 1950:** 39 with 1 rig running. **Gravity:** 23-36°. **Deepest Test:** 10,285 ft in Oligocene. **Oil Outlet:** Shell 4-in then barge to Baton Rouge. **Principal Leaseholder:** Shell.

UNNAMED (Distillate)

Se of Bayou Bleu field, Sect. 79-9s-11e. **Discovery Data:** Field by Callery & Hurt & Phillips Pet. Co.'s Repp 1, completed July 22, 1949. **Producing Formation:** Miocene 10,809-27 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 51.4°. **Deepest Test:** Discovery well at 11,300 ft in Miocene. **Principal Leaseholders:** Callery & Hurt, Phillips.

JEFFERSON PARISH

AVONDALE

Sect. 26-13s-22e. **Discovery Data:** Field by Humble O&R Co.'s T&NORR 1, completed June 20, 1949. **Producing Formation:** Miocene 8183-88 ft. **Production in 1949:** 21,694 bbls; through 1949: 21,694 bbls; daily, March 1, 1950: 167 bbls. **Producing Wells, March 1, 1950:** 2 with 1 rig running. **Gravity:** 31°. **Deepest Test:** Discovery well at 10,229 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Humble.

BARATARIA

S of New Orleans, Sect. 15-15s-23e; 1, 2-16s-23e. **Discovery Data:** Structure by refraction seismograph, Humble, 1928. Later worked with torsion balance. California Co. worked with reflection seismograph in 1937 and 1938. Field by California Co.'s Adams-Rutley 1, completed Nov. 2, 1939. **Structure:** Believed deep seated salt dome, faulted. **Producing Formation:** Miocene 7632-11,821 ft (3 pays). **Production in 1949:** 1,790,494 bbls; through 1949: 12,427,784 bbls; daily, March 1, 1950: 5118 bbls. **Producing Wells, March 1, 1950:** 31 with no rigs running. **Gravity:** 36-47°. **Deepest Test:** California Co.'s Pailet 1 at 12,608 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** California Co., Gulf.

BARATARIA, SOUTH (Distillate)

3 mi s Barataria field, Sect. 2-16s-23e. **Discovery Data:** Structure by subsurface geology and geophysics. Field by California Co.'s E. P. Brady Lse. 9-1, completed July 27, 1947. **Structure:** Salt dome. **Producing Formations:** Miocene 9688-11,866 ft (3 pays). **Production in 1949:** 32,707 bbls; through 1949: 65,988 bbls; daily, March 1, 1950: 138 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 48.8°. **Deepest Test:** Discovery well at 12,307 ft in Miocene. **Oil Outlet:** Barge to Bayou Perot then by Interstate pipe line to Baton Rouge. **Principal Leaseholder:** California Co.

BARATARIA, WEST

2 mi sw Barataria. **Discovery Data:** Structure by subsurface geology and geophysics. Field by California Co.'s J. Rathborne Ld. Lse. 4-1, completed Jan. 15, 1947. **Structure:** Salt dome. **Producing Formations:** Miocene 7226-11,465 ft (6 pays). **Production in 1949:** 1,642,963 bbls; through 1949: 3,807,136 bbls; daily, March 1, 1950: 4586 bbls. **Producing Wells, March 1, 1950:** 23 with no rigs running. **Gravity:** 37°. **Deepest Test:** California Co.'s L. Pailet et al 11 at 12,030 ft in Miocene. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholders:** California Co., Callery & Hurt & Bateman.

BAY DE CHENE

14 mi e Golden Meadows, Twp. 19s-24e. **Discovery Data:** Structure by reflection seismograph. Field by The Texas Co.'s LaFourche Basin Levee District A-1, completed Nov. 17, 1941. **Structure:** Piercement-type salt dome. **Producing Formation:** Miocene 2460-10,790 ft. **Production in 1949:** 368,787 bbls; through 1949: 1,034,269 bbls; daily, March 1, 1950: 1456 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 33°. **Deepest Test:** Texas Co.'s LaFourche Basin Lev. Dist. 1-C at 11,940 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** The Texas Co.

BAYOU DE FLEUR

5 mi ne Barataria, Sect. 65, 66-16s-24e. **Discovery Data:** Structure by reflection seismograph. Field by California Co.'s E. P. Brady et al 1, completed March 12, 1946. **Structure:** Salt dome. **Producing Formation:** Miocene 9363-10,490 ft. **Production in 1949:** 398,811 bbls; through 1949: 1,269,799 bbls; daily, March 1, 1950: 1356 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 38.7°. **Deepest Test:** California Co.'s E. P. Brady et al, Lse. 4-11 at 11,931 ft in Miocene. **Oil Outlet:** Texas Co. pipe line. **Principal Leaseholder:** California Co.

BAYOU PEROT (Brady)

Sect. 2-15s-23e. **Discovery Data:** Structure by reflection seismograph. Field by California Co.'s E. P. Brady 1, completed March 16, 1945. **Structure:** Deep dome. **Producing Formation:** Miocene 9478-88, 9897-9907 ft. **Production in 1949:** 481,219 bbls; through 1949: 1,903,582 bbls; daily, March 1, 1950: 1837 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 36°. **Deepest Test:** 12,307 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** California Co.

GRAND ISLE BLOCK 16

In Gulf of Mexico, Block 16, Tract 1114. **Discovery Data:** Structure by reflection seismograph. Field by Humble O&R Co.'s Caminada Pass-State Lse. Acct. 4-1-A, completed Nov. 28, 1948. **Structure:** Salt dome. **Producing Formations:** Miocene 4566-4618, 6128-38 ft. **Production in 1949:** 18,120 bbls; through 1949: 19,399 bbls; daily, March 1, 1950: 14 bbls. **Producing Wells, March 1, 1950:** 2 with 2 rigs running. **Gravity:** 29.7-37.6°. **Deepest Test:** Humble's Caminada Pass at St. Lse. 804-D-1 at 6128 ft in Miocene. **Oil Outlet:** Barged to storage at Avondale. **Principal Leaseholder:** Humble.

GRAND ISLE BLOCK 18

In Gulf of Mexico, Block 18. **Discovery Data:** Structure by reflection seismograph. Field by Humble O&R Co.'s Grand Isle State Lse. 801-1, completed Aug. 15, 1948. **Structure:** Salt dome. **Producing Formations:** Miocene 8640-65, 9221-36 ft. **Production in 1949:** 128,254 bbls; through 1949: 146,007 bbls; daily, March 1, 1950: 714 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 30.9°. **Deepest Test:** Humble's Grand Isle-St. Lse. Acct. 2-3 at 9424 ft in Miocene. **Oil Outlet:** Barged to storage at Avondale. **Principal Leaseholder:** Humble.

LAFITTE

6 mi se Lafitte, Sect. 9, 16, 17, 19, 20, 21, 28, 29, 30, 32-17s-24e. **Discovery Data:** Structure by reflection seismograph, Texas Co., 1934. Field by Texas Co.'s Bayou St. Denis 1, completed May 16, 1935. **Structure:** Deep dome, faulted. **Producing Formations:** Miocene 4400-10,390 ft (7 pays). **Production in 1949:** 4,017,171 bbls; through 1949: 61,241,440 bbls; daily, March 1, 1950: 11,996 bbls. **Producing Wells, March 1, 1950:** 69 with no rigs running. **Gravity:** 37°. **Deepest Test:** The Texas Co.'s Rigolets 3-B, 13,057 ft in Miocene. **Oil Outlets:** Texas 6-in; 8-in to Pt. Arthur, 10-in gas line to Lake Washington. **Principal Leaseholder:** Texas Co.

LITTLE LAKE (Distillate)

12 mi ne Golden Meadow, Sect. 5-18s-23e. **Discovery Data:** Structure by reflection seismograph. Field by Gulf Rfg. Co.'s LL&E-Little Lake A-1, completed May 18, 1948. **Structure:** Salt dome. **Producing Formation:** Miocene 9886-9912 ft. **Production in 1949:** 3243 bbls; through 1949: 7194 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None. **Gravity:** 53.4°. **Deepest Test:** Discovery well at 12,072 ft in Miocene. **Oil Outlet:** Barged to Cities Service at Lake Charles. **Principal Leaseholders:** Gulf, Humble.

MANILA VILLAGE

7 mi s Lafitte field, Sect. 35-18s-24e. **Discovery Data:** Field by Tide Water Assoc. Oil Co., State Lease 1299-1, completed March 21, 1949. **Producing Formation:** Miocene 12,980-13,050 ft. **Production in 1949:** 43,532 bbls; through 1949: 43,532 bbls; daily, March 1, 1950: 155 bbls. **Producing Wells, March 1, 1950:** 1 with 1 rig running. **Gravity:** 39°. **Deepest Test:** Discovery well at 13,050 ft in Miocene. **Oil Outlet:** Texas Co. 8-in pipe line. **Principal Leaseholder:** Tide Water.

QUEEN BESS ISLAND (Distillate)

30 mi s Lafitte field, Twp. 20s-25e. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s State-Barataria Bay Lse. 356-1, completed Jan. 27, 1946. **Structure:** Salt dome. **Producing Formation:** Miocene 11,400-13,887 ft (2 pays). **Production in 1949:** None; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None. **Gravity:** 55.8°. **Deepest Test:** Texas Co.'s State-Barataria Bay Lse. 356-4 at 16,106 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Company. **Remarks:** Deepest test is deepest in Louisiana.

WESTWEGO

Near Westwego townsite. **Discovery Data:** Structure by reflection seismograph. Field by Titanic Oil Co.'s Marrero 1, completed Jan. 25, 1941. **Structure:** Fault. **Producing Formation:** Miocene 5150-92, 5900-60, 8965-95 ft. **Production in 1949:** 57,487 bbls; through 1949: 651,436 bbls; daily, March 1, 1950: 282 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 36°. **Deepest Test:** 11,509 ft in Miocene. **Oil Outlet:** Interstate pipe line to Avondale term. **Principal Leaseholders:** Eddy Rfg. Co., Stanolind.

JEFFERSON DAVIS PARISH

BON AIR

Sect. 15, 16, 22-10s-6w. **Discovery Data:** Field by Sohio's Claudius Fontenont 1, completed Dec. 27, 1945. **Structure:** Faulted deep dome. **Producing Formations:** Marginulina 9694-9703 ft, Oligocene 10,380-96 ft. **Production in 1949:** 218,657 bbls; through 1949: 816,797 bbls; daily, March 1, 1950: 601 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 40-50.5°. **Deepest Test:** Sohio's Fontenont et al 1, 11,000 ft in Oligocene. **Oil Outlet:** Continental pipe line. **Principal Leaseholder:** Sohio Pet. Co. **Remarks:** This field also known as Iowa Junction.

CHINA (Distillate)

Sw of Elton gas field, Sect. 36-7s-4w. **Discovery Data:** Structure by reflection seismograph, Union Sulphur Co., 1938. Field by Union Sulphur Co.'s Calcasieu National 1, completed Sept. 6, 1940. **Structure:** Deep dome. **Producing Formation:** Marginulina 9175-9200 ft. **Production in 1949:** 6653 bbls; through 1949: 27,538 bbls; daily, March 1, 1950: 17 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 57°. **Deepest Test:** 10,092 ft in Miocene. **Oil Outlet:** Continental pipe line. **Principal Leaseholder:** Union Sulphur.

EDNA

6 mi se Edna. **Discovery Data:** Structure by reflection seismograph. Field by Irwin & Hudson's Houssiere-Latreille 1, completed Oct., 1948. **Structure:** Fault. **Producing Formation:** Hackberry 8908-36, 9121-24 ft. **Production in 1949:** 6203 bbls; through 1949: 7312 bbls; daily, March 1, 1950: 4 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 39°. **Deepest Test:** 9523 ft in Miocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** Irwin & Hudson.

ELTON, SOUTH

Sect. 27, 28-7s-3w. **Discovery Data:** Structure by reflection seismograph, Stanolind, Amerada, 1935. Humble and others also worked with geophysics. Field by Amerada-Stanolind's Calasieu National Bank 2-B, completed Aug. 27, 1937. **Structure:** Deep seated dome. **Producing Formation:** Miocene 8950-9362 ft. **Production in 1949:** 66,378 bbls; through 1949: 319,144 bbls; daily, March 1, 1950: 198 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 50°. **Deepest Test:** 13,210 ft in Cockfield. **Oil Outlet:** Trucks. **Gas Outlet:** United Gas 4-in. **Principal Leaseholders:** Stanolind, Amerada, Gulf.

INDIAN VILLAGE (Bayou Serpent)

6 mi nw Fenton, Sect. 29, 30-7s-6w. **Discovery Data:** Structure by reflection seismograph. Field by Continental's King Corp. 1, completed Oct. 7, 1944. **Structure:** Deep seated dome. **Producing Formation:** Miocene 7135-45 ft. **Production in 1949:** 47,303 bbls; through 1949: 243,315 bbls; daily, March 1, 1950: 113 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 37°. **Deepest Test:** 9311 ft in Vicksburg. **Oil Outlet:** Trucks. **Principal Leaseholder:** Continental.

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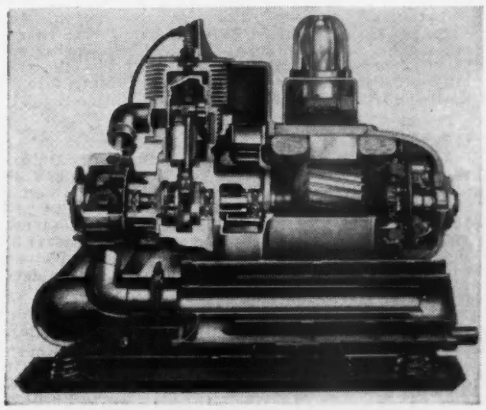

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JENNINGS, SOUTH

S of Jennings, Sect. 15, 16-10s-3w. **Discovery Data:** Structure by reflection seismograph and torsion balance, Shell, 1934: Stanolind, 1934-35. Field by Stanolind's Calcasieu National Bank 1, completed Nov. 12, 1936. **Structure:** Deep dome. **Producing Formation:** Miocene 8638-10,925 ft (3 pays). **Production in 1949:** *267,187 bbls; through 1949: *2,579,502 bbls; daily, March 1, 1950: *768 bbls. **Producing Wells, March 1, 1950:** 3 (oil) with no rigs running. **Gravity:** 47-50°. **Deepest Test:** 12,034 ft in Miocene. **Oil Outlets:** Distillate trucked. United Gas Pipe Line 6-in (gas), Stanolind Oil & Gas 3-in (gas). **Principal Leaseholders:** Stanolind, Loffland Brothers, Gulf, Union Sulphur. **Remarks:** *Production figures include distillate separated at Stanolind's recycling plant.

LAKE ARTHUR (Roanoke, South)

Sect. 23, 25, 31, 26-10s-4w. **Discovery Data:** Structure by reflection seismograph, Shell, 1935. Field by Shell's Sturdevant 1, completed April 7, 1937. **Structure:** Deep dome. **Producing Formation:** Miocene 4460-11,348 ft (7 pays). **Production in 1949:** 324,653 bbls; through 1949: 3,751,641 bbls; daily, March 1, 1950: 891 bbls. **Producing Wells, March 1, 1950:** 9 with no rigs running. **Gravity:** 41-54°. **Deepest Test:** 12,088 ft in Miocene. **Oil Outlet:** Continental pipe line to Westlake refinery. **Principal Leaseholders:** Union Sulphur Co., Shell. **Remarks:** Also called Roanoke, South.

NIBLETTS (Abandoned)

10 mi s Welsh, Sect. 1-11s-5w. **Discovery Data:** Structure by reflection seismograph in 1939 for Continental. Field by Continental Oil Co.'s Nibletts Farms 1, completed March 28, 1940. **Structure:** Fault. **Producing Formation:** Marginulina 11,604-624 ft. **Production:** Total 5450 bbls. **Gravity:** 42°. **Deepest Test:** 11,748 ft in Miocene. **Principal Leaseholder:** Continental Oil Co. **Remarks:** Discovery well went to salt water and field was abandoned July 8, 1940.

ROANOKE

Sect. 1, 2, 11, 12, 14-9s-4w. **Discovery Data:** Structure by surface indications, torsion balance and seismograph, Vacuum Oil Co., 1928. Field by Sheli Oil Co.'s Kratzler 1, completed May 24, 1934. **Structure:** Apparently deep dome. **Producing Formation:** Miocene 6200-11,348 ft (7 pays). **Production in 1949:** 498,211 bbls; through 1949: 14,635,246 bbls; daily, March 1, 1950: 1305 bbls. **Producing Wells, March 1, 1950:** 26 with no rigs running. **Gravity:** 33-57°. **Deepest Test:** 10,748 ft in Miocene. **Oil Outlets:** Shell 6-in, Interstate 6-in pipe lines. **Principal Leaseholders:** Shell, Humble, Union Sulphur.

TEPETATE, WEST

5 mi se of Elton, Sect. 38-7s-3w. **Discovery Data:** Structure by reflection seismograph. Field by Barnsdall Oil Co.'s Minos Miller 1, completed Oct. 4, 1944. **Structure:** Probable deep dome. **Producing Formation:** Miocene 8260-9170 ft. **Production in 1949:** 2,016,388 bbls; through 1949: 8,847.929 bbls; daily, March 1, 1950: 5661 bbls. **Producing Wells, March 1, 1950:** 43 with no rigs running. **Gravity:** 32-40°. **Deepest Test:** 10,032 ft in Miocene. **Oil Outlets:** Continental 8-in pipe line, Delta Pipe Line Co. 10-in (gas). **Principal Leaseholders:** Barnsdall, W. T. Burton.

THORNWELL, SOUTH (Distillate)

6 mi sw Thornwell, Sect. 36-11s-5w. **Discovery Data:** Structure by reflection seismograph. Field by Cities Service Oil Co.'s Lacassine 1, completed Mar. 12, 1942. **Structure:** Deep seated dome. **Producing Formation:** Miocene 9620-44 ft. **Production in 1949:** 24,729 bbls; through 1949: 168,508 bbls; daily, March 1, 1950: 60 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 53°. **Deepest Test:** 11,274 ft in Marginulina. **Oil Outlet:** Trucked to Evangeline refinery. **Principal Leaseholder:** Cities Service.

WELSH

Sect. 21, 22, 27, 28-9s-5w. **Discovery Data:** Structure by elevation, gas seeps. Field by Rio Bravo Oil Co.'s No. 1, completed 1903. **Structure:** Piercement-type salt dome, salt 6315 ft. **Producing Formations:** Pliocene 1150-3000 ft, Miocene 5300-8900 ft (5 pays). **Production in 1949:** 99,027 bbls; through 1949: 884,041 bbls; daily, March 1, 1950: 899 bbls. **Producing Wells, March 1, 1950:** 13 with no rigs running. **Gravity:** 22-49°. **Deepest Test:** 10,358 ft in Hackberry. **Oil Outlet:** Union Sulphur Co. 6-in. **Principal Leaseholders:** Union Sulphur, Homer T. Moore, V. Mondell Peters, Stanolind.

WELSH, NORTH (Distillate)

1½ mi off ne flank of Welsh dome, Sect. 11-9s-5w. **Discovery Data:** Field by Continental Oil Co.'s R. A. Estes 1, completed Aug. 5, 1949. **Producing Formation:** Miocene 11,374-87 ft. **Production in 1949:** 3446 bbls; through 1949: 3446 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 41.4°. **Deepst Test:** Discovery well at 11,474 ft in Miocene. **Principal Leaseholder:** Continental.

WOODLAWN

Sect. 12-9s-8w. **Discovery Data:** Structure by geophysics. Union Sulphur Co., 1937. Magnolia torsion balance and reflection seismograph, 1934. Strake Pet. Corp. also worked in this area. Field by Union Sulphur Co.'s Calcasieu National Bank 1, completed Feb. 13, 1938. First oil well: Union Sulphur Co.'s Calcasieu National Bank 2, completed April 24, 1938. **Structure:** Deep seated dome. **Production Formations:** Heterostegina 7488-7500 ft, Marginulina 8000-8180 ft, Hackberry 9500-50 ft. **Production in 1949:** 380,432 bbls; through 1949: 8,681,080 bbls; daily, March 1, 1950: 952 bbls. **Producing Wells, March 1, 1950:** 18 with no rigs running. **Gravity:** 34-51°. **Deepest Test:** 10,111 ft in Hackberry. **Oil Outlets:** Union Sulphur Co.'s 6-in. Delta Pipe Line Co.'s 16-in (gas), Union Sulphur Co.'s 6-in (gas). **Principal Leaseholder:** Union Sulphur Co.

LAFAYETTE PARISH

DUSON (Distillate)

2 mi s Duson, Sect. 5-10s-3e. **Discovery Data:** Structure by reflection seismograph. Field by Union Sulphur Co.'s Harson Unit A-1, completed May 22, 1947. **Structure:** Salt dome. **Producing Formation:** Miocene 10,840-56 ft. **Production in 1949:** 332 bbls; through 1949: 926 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 46.3°. **Deepest Test:** Discovery well at 12,067 ft in Miocene. **Oil Outlet:** None. **Gas Outlet:** United Gas 10-in. **Principal Leaseholder:** Union Sulphur.

LAFOURCHE PARISH

BAY MARCHAND (Block 2)

2½ mi offshore from Bayou La Fourche in Gulf of Mexico. **Discovery Data:** Structure by refraction seismograph, 1927, and reflection seismograph, California Co., 1947. Field by The California Co.'s Louisiana State Lse. 1366-1, completed March 7, 1949. **Structure:** Piercement-type salt dome. **Producing Formations:** Miocene 2873-2892, 3900-25, 5024-66 ft. **Production in 1949:** 397,153 bbls; through 1949: 397,153 bbls; daily, March 1, 1950: 3502 bbls. **Producing Wells, March 1, 1950:** 14 with 1 rig running. **Gravity:** 20.1-40.9°. **Deepest Test:** California Co.'s La. State Lse. 1367-72 at 5702 ft in salt. **Oil Outlet:** Continental pipe line. **Principal Leaseholder:** California Co. **Remarks:** An unsuccessful test was drilled onshore to 6380 ft in 1930.

BULLY CAMP

7 mi nw Golden Meadows, Sect. 1-19s-20e, 36-19s-21e. **Discovery Data:** Structure by refraction and reflection seismograph. Field by Gulf Rfg. Co.'s Delta Securities 1, completed Nov. 11, 1942. **Structure:** Piercement-type salt dome. **Producing Formations:** Pliocene 996-1002 ft, Miocene 6395-6435, 6470-6640, 7035-45, 7788-98 ft. **Production in 1949:** 272,960 bbls; through 1949: 1,518,520 bbls; daily, March 1, 1950: 790 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 33.4-35.9°. **Deepest Test:** 11,284 ft in Miocene. **Oil Outlet:** Gulf 4-in pipe line. **Principal Leaseholder:** Gulf.

CHACAHOULA

Twp. 15s-15e. **Discovery Data:** Structure by gas seepage, refraction seismograph, Gulf, 1926. Geophysics by Sun on the flank in 1937. Field by Sun's Dibert, Stark & Brown 1, completed Sept. 6, 1938. **Structure:** Piercement-type salt dome, cap rock 1035 ft, salt 1302 ft. **Producing Formations:** Miocene 4210-9250 ft (9 pays). **Production in 1949:** 679,433 bbls; through 1949: 7,100,452 bbls; daily, March 1, 1950: 2142 bbls. **Producing Wells, March 1, 1950:** 35 with 1 rig running. **Gravity:** 34-42°. **Deepest Test:** 13,004 ft in Miocene. **Oil Outlet:** Sun 6-in to Black Bayou. **Principal Leaseholders:** Sun, Humble, Pure. **Remarks:** Was called Thibodeaux.

DELTA FARMS

2½ mi sw Barataria, Twps. 16, 17s-22, 23e. **Discovery Data:** Structure by reflection seismograph, Tide Water, 1938. Field by Tide Water's Delta Farms 1, completed March 18, 1940. **Structure:** Deep seated domal structure. **Producing Formation:** Miocene 6908-11,819 ft (6 pays). **Production in 1949:** 7,576,764 bbls; through 1949: 31,544,545 bbls; daily, March 1, 1950: 21,760 bbls. **Producing Wells, March 1, 1950:** 119 with no rigs running. **Gravity:** 24.2-40.5°. **Deepest Test:** California Co.'s La. Delta Frms. Lse. 1-14 at 12,888 ft in Miocene. **Oil Outlet:** Interstate 6-in pipe line. **Principal Leaseholders:** California Co., Humble, Texas Co. **Remarks:** Also known as Bay Brussel and also partly in Jefferson Parish.

GOLDEN MEADOW

Twps. 19, 20s-21, 22e. **Discovery Data:** Structure by reflection seismograph, Texas Co. and Louisiana Land & Exploration Co., 1936. Field by Texas Co.'s La Terre 1, completed Dec. 31, 1938. **Structure:** Probable deep seated dome. **Producing Formations:** Miocene 2544-2679, 7969-9792, 10,040-11,888 ft (14 pays). **Production in 1949:** 4,158,964 bbls; through 1949: 35,584,192 bbls; daily, March 1, 1950: 14,442 bbls. **Producing Wells, March 1, 1950:** 232 with 3 rigs running. **Gravity:** 26-47°. **Deepest Test:** 12,256 ft in Miocene. **Oil Outlet:** Interstate 8-in pipe line. **Principal Leaseholders:** Texas Co., Mar-Tex, Temple Hargrove, General American Oil, Lynn Oil, Monteleone-O'Neill, Bateman & Hedge, Hassie Hunt Trust, Barnsdall, L. J. Roussel, Grubb & Hawkins.

LAFOURCHE CROSSING (Distillate)

Sect. 132-15s-17e. **Discovery Data:** Structure by gas seepage, paraffin beds; shot holes showed gas reflection seismograph, Perry Scranton 1936. Geophysics showed a complex structure with about 40 ft of closure with no closure on the ne. Field by Mikton Oil Co.'s Martinez 2, completed Sept. 15, 1939. **Structure:** Deep dome. **Producing Formations:** Miocene 9620-10,125 ft, 4 pays averaging 17 ft thickness. **Production in 1949:** 49,705 bbls; through 1949: 1,269,703 bbls; daily, March 1, 1950: 142 bbls. **Producing Wells, March 1, 1950:** 6 with no rigs running. **Gravity:** 56°. **Deepest Test:** J. R. Meeker's Gaubert 1, 12,503 ft in Miocene. **Oil Outlets:** Barge. Lake Long Gas 8-in (gas). **Principal Leaseholders:** Mikton Oil Co., Lisbon-Iberia Oil Co.

LAKE LONG

Near Bourg, Sect. 64, 65, 67-17s-19e. **Discovery Data:** Structure by reflection seismograph, Fohs Oil Co. and Pilgrim Exploration Co., 1935; Gulf, Shell, worked with geophysics. Field by Fohs and Pilgrim's State-Lake Long 1, completed June 22, 1937. **Structure:** Deep seated dome. **Producing Formation:** Miocene 9070-10,416 ft. **Production in 1949:** 574,601 bbls; through 1949: 6,846,978 bbls; daily, March 1, 1950: 1380 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 36-51°. **Deepest Test:** 11,903 ft in Miocene. **Oil Outlets:** Barge; Lake Long Gas Co. 8-in and United Gas (gas). **Principal Leaseholder:** Texas Gulf Prod. Co.

LAKE RACCOURCI

In Timbalier Bay. **Discovery Data:** Field by Humble O&R Co.'s State Lse. 1450-1, completed April 13, 1949. **Producing Formation:** Miocene 9841-44, 14,434-67 ft. **Production in 1949:** 14,898 bbls; through 1949: 14,898 bbls; daily, March 1, 1950: 74 bbls. **Producing Wells, March 1, 1950:** 2 with 1 rig running. **Gravity:** 48.4-50.2°. **Deepest Test:** Humble's St. Lse. 1452-1 at 14,918 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Humble.

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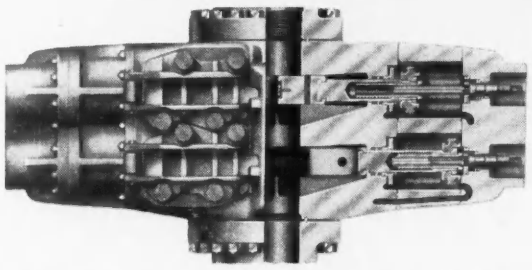

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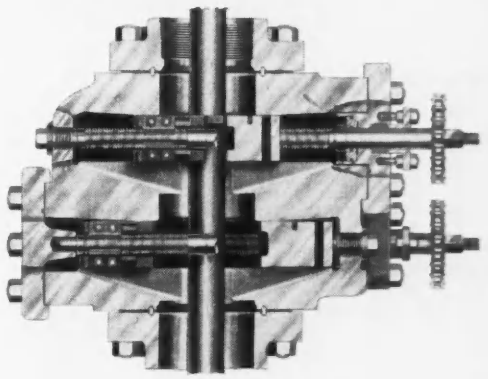

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LEEVILLE

Sect. 22, 23, 26, 27, 28, 34, 35-21s-22e; 2-22s-22e. **Discovery Data:** Structure by seismograph, Gulf, 1928. Field by Texas Co.'s La. Ld. & Expl. 2, completed in April, 1931. **Structure:** Piercement-type salt dome, salt 4080 ft. **Producing Formations:** Miocene 3040-11,608 ft (16 pays averaging 35 ft thickness), 12,980-85, 13,360-410, 14,075-87 ft. **Production in 1949:** 1,924,816 bbls; through 1949: 35,108,330 bbls; daily, March 1, 1950: 5841 bbls. **Producing Wells, March 1, 1950:** 92 with 2 rigs running. **Gravity:** 28-47.9°. **Deepest Test:** Texas Co.'s LLE-Leeville 111, at 14,473 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Texas Co., Placid Oil, Latex Gulf, J. C. Chance Well Service. **Remarks:** Sometimes called Bayou Lafourche.

LITTLE TEMPLE (Abandoned)

11 mi ne Cutoff, Sect. 19-17s-23e. **Discovery Data:** Structure by reflection seismograph. Field by Humble's Louisiana Delta Farms Co. 1, completed April 16, 1946. **Structure:** Dome. **Producing Formation:** Miocene 10,585-635 ft. **Production Total:** 2463 bbls. **Gravity:** 31°. **Deepest Test:** Humble's La. Delta Farms 1, 12,007 ft in Miocene. **Principal Leaseholder:** Humble. **Remarks:** Abandoned in Oct., 1946.

RACELAND

Sect. 34, 35-15s-19e. **Discovery Data:** Structure by surface geology, reflection and refraction seismograph, Amerada and Louisiana Land & Exploration Co., 1936. Field by Amerada and Louisiana Land's South Coast 1, completed Jan. 25, 1938. **Structure:** Deep seated dome. **Producing Formation:** Miocene 4371-10,091 ft (6 pays). **Production in 1949:** 644,194 bbls; through 1949: 6,708,510 bbls; daily, March 1, 1950: 1528 bbls. **Producing Wells, March 1, 1950:** 21 with no rigs running. **Gravity:** 36-50°. **Deepest Test:** 12,200 ft in Miocene. **Oil Outlet:** Interstate 4-in pipe line. **Principal Leaseohlders:** Amerada, South Shore Oil, H. L. Hunt, Lynn-Temple Hargrove.

TIMBALIER BAY

In Timbalier Bay, Sect. 3-23s-21e. **Discovery Data:** Structure by gravity meter and reflection seismograph, Gulf, 1936-37. Field by Gulf's State-Timbalier Bay PP-3, completed Jan. 25, 1938. **Structure:** Deep seated dome. **Producing Formation:** Miocene 5330-6977 ft. **Production in 1949:** None reported; through 1949: 370,000 bbls; daily, March 1, 1950: None reported. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 32.8°. **Deepest Test:** Discovery well at 8728 ft in salt. **Oil Outlet:** Barge. **Principal Leaseholders:** Gulf, Texas.

VALENTINE

6 mi se Lockport, Twp. 17s-20e. **Discovery Data:** Structure by surface indications which induced drilling shallow wells that gave encouraging data. Reflection seismograph, Barnsdall, 1932. Later worked by Pan American Prod. Co. Field by Pan American Production and Barnsdall's Harange 1, completed Dec. 29, 1936. **Structure:** Piercement-type salt dome, solid salt 6580 ft, broken salt 6573 ft. **Producing Formation:** Miocene 3838-11,091 ft (13 pays). **Production in 1949:** 413,518 bbls; through 1949: 6,941,172 bbls; daily, March 1, 1950: 1134 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 33°. **Deepest Test:** Texas Co.'s Luke Guidrey 1 at 12,780 ft in Miocene. **Oil Outlets:** Interstate 8-in pipe line. **Principal Leaseholders:** Pan American, Joe W. Brown.

LIVINGSTON PARISH

SPRINGVILLE

1½ mi nw Springville, Sect. 9-7s-5e. **Discovery Data:** Field by Danciger O&R Co.'s Myrtle E. Smiley 1, completed Dec. 15, 1949. **Producing Formations:** Catahoula 8006-08 ft. **Production in 1949:** 8588 bbls; through 1949: 8588 bbls; daily, March 1, 1950: 8 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 43.5°. **Deepest Test:** Discovery well at 8748 ft in Miocene. **Oil Outlet:** Truck. **Principal Leaseholder:** Danciger O&R Co.

ORLEANS PARISH

UNKNOWN PASS (Abandoned)

18 mi ne New Orleans, Sect. 18-11s-15e. **Discovery Data:** Structure by reflection seismograph. Field by W. T. Burton's L&NRR 2, completed June 24, 1941. **Structure:** Deep seated dome, faulted. **Producing Formation:** Miocene 9882-94 ft. **Production Total:** 9000 bbls. **Gravity:** 52°. **Deepest Test:** 10,405 ft Miocene. **Principal Leaseholder:** W. T. Burton. **Remarks:** Because of production of 30 bbls oil daily and 140 bbls salt water daily field was abandoned in 1943.

PLAQUEMINES PARISH

ALLIANCE

13 mi nw Pointe a la Hache, Twp. 16s-24e. **Discovery Data:** Structure by reflection seismograph. Field by California Co.'s E. P. Brady Lse. 4-4, completed Oct. 14, 1946. **Structure:** Deep salt dome. **Producing Formations:** Miocene 9070-90, 9252-57, 9346-70, 9700-30 ft. **Production in 1949:** 65,277 bbls; through 1949: 195,576 bbls; daily, March 1, 1950: 123 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 49.7°. **Deepest Test:** Discovery well at 14,187 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** California Co.

BASTIAN BAY

N of USCGS Station "Augusta" in Sect. 38, sw Quarantine Bay. **Discovery Data:** Structure by reflection seismograph, Louisiana Land & Exploration Co., 1937-38. Field by Phillips Petroleum Company's LLE-Fee 1, completed Aug. 17, 1941. **Structure:** Probably deep seated dome. **Producing Formation:** Miocene 4340-9980 ft, 7 sands averaging 45 ft thickness. **Production in 1949:** 302,758 bbls; through 1949: 1,558,326 bbls; daily, March 1, 1950: 875 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 40°. **Deepest Test:** Phillips' LLE-Fee 16, 12,933 ft in Miocene. **Oil Outlet:** Barge to Burras then tank car to Baton Rouge. **Principal Leaseholder:** Phillips.

BLACK BAY (Distillate)

Twp. 17s-17e. **Discovery Data:** Field by Gulf Refining Co.'s State QQ-2, completed Sept. 29, 1949. **Producing Formation:** Miocene 10,090-102 ft. **Production in 1949:** 193 bbls; through 1949: 193 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** 1 (shut in) with 1 rig running. **Gravity:** 54.2°. **Deepest Test:** Discovery well at 10,212 ft in Miocene. **Principal Leaseholder:** Gulf.

BRETON SOUND (Gas)

60 mi se of New Orleans in Gulf of Mexico. **Discovery Data:** Structure by reflection seismograph. Field by Barnsdall Oil Co.'s State Blk. 36-1, completed March 23, 1948. **Structure:** Deep salt dome. **Producing Formation:** Miocene 4130-50 ft. **Production:** Shut in. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Deepest Test:** Discovery well at 10,609 ft in Miocene. **Principal Leaseholders:** Barnsdall, Callery-Hurt & Seaboard jointly.

BRETON SOUND BLOCK 32

In Breton Sound. **Discovery Data:** Field by Barnsdall Oil Co.'s Breton-St. Lse. 1227-5, completed Aug. 26, 1949. **Structure:** Salt dome. **Producing Formation:** Miocene 5802-04 ft. **Production in 1949:** 19,094 bbls; through 1949: 19,094 bbls; daily, March 1, 1950: 144 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 25.1°. **Deepest Test:** Discovery well at 9022 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Barnsdall, Callery-Hurt & Seaboard jointly.

DELACROIX ISLAND

8 mi n of Pointe a la Hache, Sect. 3, 4-16s-14e. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s State-Delacroix 1, completed May 5, 1941. **Structure:** Faulted dome. **Producing Formation:** Miocene 8976-9697 ft. **Production in 1949:** 562,873 bbls; through 1949: 2,590,226 bbls; daily, March 1, 1950: 1585 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 36°. **Deepest Test:** 11,165 ft in Miocene. **Oil Outlet:** Texas Co. 6-in pipe line to Devant, then by barge to Chalmette. **Principal Leaseholder:** Texas Co.

DELTA DUCK

7 mi se Grand Bay field. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s State-Octave Pass 1, completed April 27, 1941. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 6230-8714, 11,370-400 ft. **Production in 1949:** 662,100 bbls; through 1949: 2,569,465 bbls; daily, March 1, 1950: 2080 bbls. **Producing Wells, March 1, 1950:** 15 with 1 rig running. **Gravity:** 35-56°. **Deepest Test:** 12,086 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Company.

GARDEN ISLAND BAY

At the mouth of Mississippi River, Twps. 23s-32, 33e. **Discovery Data:** Structure by refraction seismograph, McCollum Exploration Co. 1928. Field by Texas Co.'s Garden Island Bay 16, completed Sept. 11, 1935. **Structure:** Piercement-type salt dome, cap rock 1691 ft, salt 2017 ft. **Producing Formation:** Miocene 4072-9066 ft (16 pays). **Production in 1949:** 1,513,235 bbls; through 1949: 15,115,762 bbls; daily, March 1, 1950: 4930 bbls. **Producing Wells, March 1, 1950:** 46 with no rigs running. **Gravity:** 28-36°. **Deepest Test:** Texas Co.'s St.-Garden Island Bay Lse. 1001-B-1-A, at 11,675 ft in Miocene. **Oil Outlet:** Texas 6-in pipe line to Pilot Town then barge. **Principal Leaseholder:** Texas Co.

GRAND BAY (Bird Island)

Twps. 20s-18, 19e. **Discovery Data:** Structure by reflection seismograph, Gulf, 1937. Field by Gulf's Grand Prairie Levee Dist. 1-A, completed July 9, 1938. **Structure:** Probably deep dome, faulted. **Producing Formation:** Miocene 6125-10,453 ft, 8 pays average 20 ft thickness. **Production in 1949:** 3,563,685 bbls; through 1949: 27,776,083 bbls; daily, March 1, 1950: 10,606 bbls. **Producing Wells, March 1, 1950:** 73 with 1 rig running. **Gravity:** 24-39°. **Deepest Test:** 12,034 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Gulf and Texas Co.

LAKE HERMITAGE

Sect. 1, 10, 11, 12-18s-25e. **Discovery Data:** Structure by refraction seismograph, Gulf and Humble, 1928. Field by Gulf's Lafourche Levee Basin District 1, completed in May, 1934. **Structure:** Piercement-type salt dome, salt 3811 ft. **Producing Formations:** Miocene 3116-4646 ft (4 pays averaging 15 ft thickness), 9066-9078, 9368-9416, 11,895-954, 12,022-36 ft. **Production in 1949:** 4916 bbls; through 1949: 189,218 bbls; daily, March 1, 1950: 70 bbls. **Producing Wells, March 1, 1950:** 2 with 1 rig running. **Gravity:** 32-45.5°. **Deepest Test:** Gulf's Lafourche Levee Dist. 16, at 12,387 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Gulf.

LAKE WASHINGTON

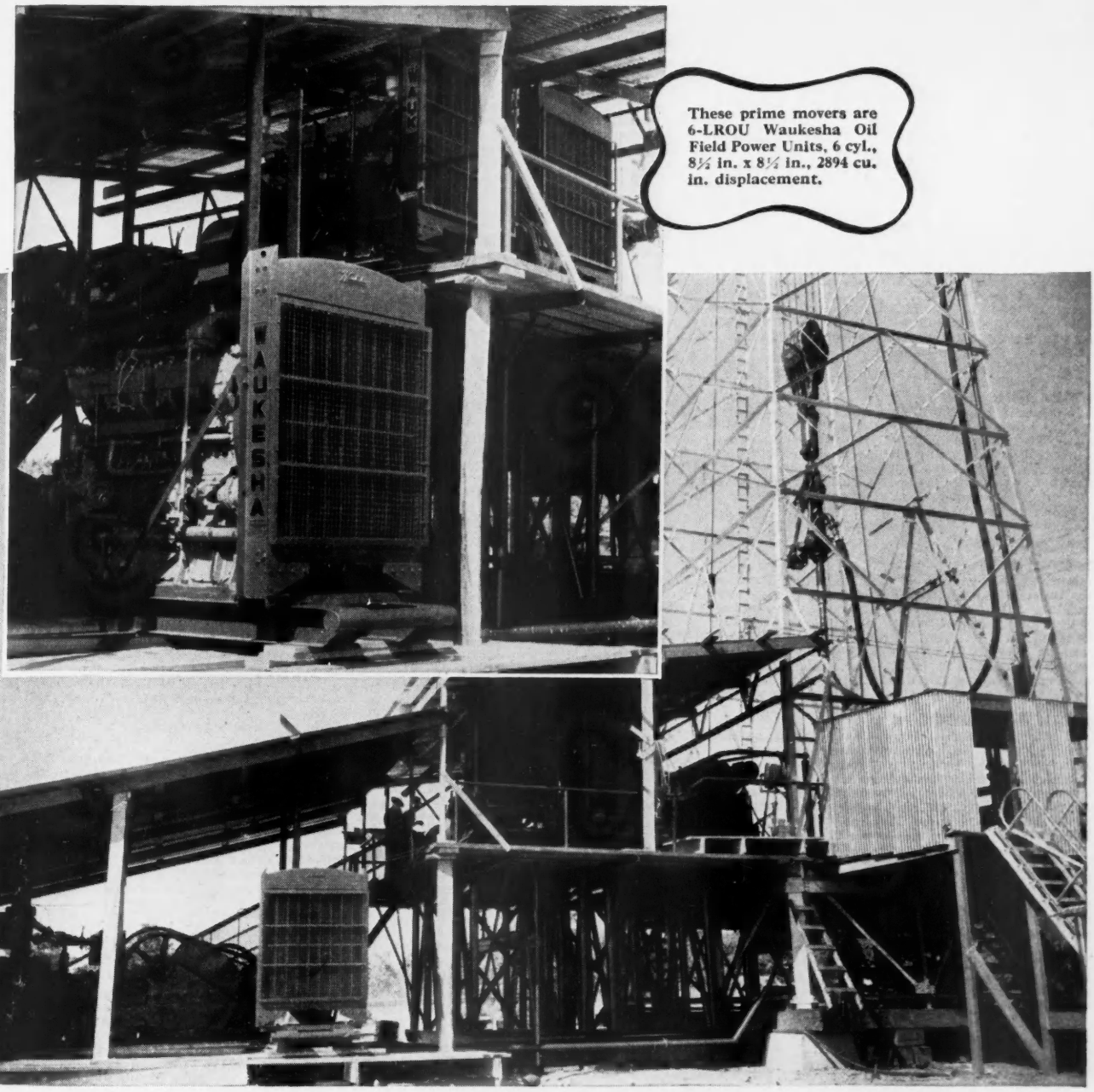
Lake Washington area State Lse. 1465. **Discovery Data:** Field by Humble O&R Co.'s State-Lake Washington 1, completed Sept. 20, 1949. **Producing Formation:** Miocene 8617-23 ft. **Production in 1949:** 150,160 bbls; through 1949: 150,160 bbls; daily, March 1, 1950: 429 bbls. **Producing Wells, March 1, 1950:** 8 with 1 rig running. **Gravity:** 30.3°. **Oil Outlets:** Barge, United Gas 8-in pipe line (gas). **Principal Leaseholder:** Humble.

MAIN PASS—BLOCK 69

In Gulf of Mexico. **Discovery Data:** Structure by reflection seismograph. Field by Calif. Co.'s State Lse. 1278-1, completed Aug. 10, 1948. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 5848-73, 6272-95 ft. **Production in 1949:** 309,783 bbls; daily, March 1, 1950: 2486 bbls. **Producing Wells, March 1, 1950:** 9 with 1 rig running. **Gravity:** 26.2°. **Oil Outlet:** Barged to storage at Avondale. **Principal Leaseholders:** California Co, Shell.

PELICAN ISLAND (Gas)

8 mi in Gulf of Mexico, Block 30, State Tract 1202. **Discovery Data:** Field by Humble O&R Co. Pelican Isle St. Lse. Acct. 1-1, completed April 8, 1949. **Structure:** Salt dome. **Producing Formation:** Miocene 2169-83 ft. **Producing Wells, March 1, 1950:** None with no rigs running. **Deepest Test:** Discovery well at 7500 ft in Miocene. **Principal Leaseholder:** Humble. **Remarks:** Shut in.



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POINTE A LA HACHE

2½ mi n of Pointe a la Hache, Sect. 34-16s-14e; 3-17s-14e. **Discovery Data:** Structure by reflection seismograph. Field by S. W. Richardson's Delacroix E-4, completed May 13, 1948. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 8838-42, 10,142-50, 10,190-10,215, 10,677-82, 10,970-33 ft. **Production in 1949:** 317,031 bbls; through 1949: 322,135 bbls; daily, March 1, 1950: 2594 bbls. **Producing Wells, March 1, 1950:** 16 with 3 rigs running. **Gravity:** 34-54°. **Deepest Test:** Discovery well at 13,313 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Richardson & Bass, Humble.

POTASH

Sect. 4, 10-18s-15e. **Discovery Data:** Structure by refraction seismograph, Gulf 1929, Humble and Texas Gulf Sulphur Co. core drilled area in 1937. Field by Humble's Orleans Levee Board 11, completed Sept. 20, 1937. **Structure:** Piercement-type salt dome, cap rock 804 ft, salt 1465 ft. **Producing Formation:** Miocene 1800-10,879 ft (7 pays). **Production in 1949:** 471,287 bbls; through 1949: 5,202,522 bbls; daily, March 1, 1950: 1249 bbls. **Producing Wells, March 1, 1950:** 13 with no rigs running. **Gravity:** 28°. **Deepest Test:** 11,783 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Humble, with sulphur rights leased to Texas Gulf Sulphur Co.

QUARANTINE BAY

In Quarantine Bay, Twp. 19s-17e. **Discovery Data:** Structure by gravity meter and reflection seismograph, Gulf, 1936. Field by Gulf's State QQ-1, completed Nov. 28, 1937. **Structure:** Believed deep dome, faulted. **Producing Formation:** Miocene 7693-10,517 ft (12 pays). **Production in 1949:** 3,455,339 bbls; through 1949: 29,323,651 bbls; daily, March 1, 1950: 9921 bbls. **Producing Wells, March 1, 1950:** 56 with 1 rig running. **Gravity:** 28.3-35.7°. **Deepest Test:** Gulf's State QQ-59, at 13,014 ft in Miocene. **Oil Outlet:** Gulf 6-in, then barge. **Principal Leaseholder:** Gulf.

ROMERE PASS

Midway between Grand Bay and Main Pass. Block 69 fields. **Discovery Data:** Field by California Co.'s North Main Pass Unit 1, completed Jan. 10, 1950. **Structure:** Salt dome. **Producing Formation:** Miocene 9026-47 ft. **Production in 1949:** None; through 1949: None; daily, March 1, 1950: 211 bbls. **Producing Wells, March 1, 1950:** 1 with 1 rig running. **Gravity:** 32.9°. **Deepest Test:** California Co.'s North Main Pass Unit 2, at 10,858 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** California Co. **Remarks:** Originally called North Main Pass.

SOUTH PASS BLOCK 24

Block 24 in South Pass Area of Gulf of Mexico. **Discovery Data:** Field by Shell Oil Company's State Lease 1008-1, completed April 26, 1950. **Structure:** Unknown. **Producing Formation:** Miocene 6530-34 ft. **Production:** Initial production of discovery well was 55 barrels daily through 3/16-in choke. **Producing Wells, March 1, 1950:** 0 with 1 rig running. **Gravity:** 22.7°. **Deepest Test:** Shell Oil Co.'s State Lease 1008-1, at 12,128 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Shell Oil Co. **Remarks:** Second well is now drilling.

STELLA

9 mi se New Orleans. Twps 14, 15s-24e. **Discovery Data:** Structure by reflection seismograph, California Co., 1938. Field by California Co.'s Delta Minerals 1, completed Aug., 1940. **Structure:** Probably deep seated dome. **Producing Formations:** Miocene 6300-10,000 ft, 4 pays averaging 25 ft thickness each. **Production in 1949:** 320,779 bbls; through 1949: 2,135,857 bbls; daily, March 1, 1950: 1042 bbls. **Producing Wells, March 1, 1950:** 9 with no rigs running. **Gravity:** 40°. **Deepest Test:** 10,807 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** California Co., Callery & Hurt.

TIGER PASS (Distillate)

State Lse. 818. In Gulf of Mexico. East of Pelican Isle field. **Discovery Data:** Field by Humble O&R Co.'s Tiger Pass A-3, completed in 1949. **Structure:** Salt dome. **Producing Formations:** Miocene 9475-80 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 0 with no rigs running. **Gravity:** 64°. **Deepest Test:** Discovery well at 11,122 ft in Miocene. **Principal Leaseholder:** Humble.

VENICE

Twp. 21s-30e. **Discovery Data:** Structure by refraction seismograph, Gulf 1928. Field by Tide Water's Manhattan 3, completed July 18, 1937. **Structure:** Piercement-type salt dome, cap rock 2216 ft, salt 2965. **Producing Formations:** Miocene 3451-12,955 ft (15 pays). **Production in 1949:** 4,613,807 bbls; through 1949: 28,729,844 bbls; daily, March 1, 1950: 14,170 bbls. **Producing Wells, March 1, 1950:** 69 with no rigs running. **Gravity:** 30-39°. Deepest Test: Tide Water's Buras Lev. Dist. 29, 13,020 ft in Miocen. **Oil Outlet:** Barge. **Principal Leaseholder:** Tide Water. **Remarks:** Was called Spanish Pass or Rose Dome.

WEST BAY

Near mouth of Mississippi River, 12 mi. s of Venice. Twps. 22, 23s-30e. **Discovery Data:** Structure by reflection seismograph. Field by Gulf's J. G. Timolat 1-B, completed Dec. 10, 1940. **Structure:** Piercement-type salt dome. **Producing Formations:** Miocene 6260-10,462 ft. **Production in 1949:** 2,266,251 bbls; through 1949: 11,641,900 bbls; daily, March 1, 1950: 6321 bbls. **Producing Wells, March 1, 1950:** 38 with 1 rig running. **Gravity:** 29-36°. **Deepest Test:** Gulf's Buras Lev. Dist. 9-E, at 11,763 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Gulf.

UNNAMED

3 mi s of Lake Washington field. Sect. 1-21s-26e. **Discovery Data:** Field by Placid Oil Co. and Texas Co.'s State of Louisiana-LL&E 5-1, completed May 4, 1950. **Structure:** Unknown. **Producing Formation:** Miocene 7824-34 ft. **Production:** Initial production of discovery well was 178 barrels daily through ⅛-in choke. **Producing Wells, March 1, 1950:** 0 with no rigs running. **Gravity:** 37.5°. **Deepest Test:** Placid Oil Co. and Texas Co.'s State of Louisiana-LL&E 5-1, at 10,032 ft in Miocene. **Oil Outlet:** Unknown. **Principal Leaseholders:** Placid Oil Co., Texas Co.

POINT COUPEE PARISH

FORDOCHE

1 mi ne Lottie Twst. Sect 29-6s-8e. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s Joseph Oscar Long et al 1, completed Dec. 25, 1948. **Producing Formations:** Frio 8197-207, 8282-90, 8607-14, 8798-8802 ft. **Production in 1949:** 181,147 bbls; through 1949: 183,337 bbls; daily, March 1, 1950: 1452 bbls. **Producing Wells, March 1, 1950:** 13 with 1 rig running. **Gravity:** 34.6-39.9°. **Deepest Test:** Discovery well at 10,280 ft in Frio. **Oil Outlet:** Interstate 10-in pipe line. **Principal Leaseholder:** Texas Co.

LOTTIE

3 mi w Lottie. Section 25-6s-8e. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s Lottie Ld & Dev Co. 1, completed Feb. 8, 1948. **Structure:** Fault. **Producing Formations:** Frio 8845-65 ft. **Production in 1949:** 15,765 bbls; through 1949: 26,150 bbls; daily, March 1, 1950: 233 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 41.8-53°. **Deepest Test:** Texas Co.'s Local Investors, Inc., 1, at 10,597 ft in Frio. **Oil Outlet:** Trucked to Interstate 10-in pipe line. **Principal Leaseholders:** Texas Co. 50%, Sinclair 50%.

UNNAMED (Distillate)

4 mi w-sw of Lottie Townsite, 2½ mi sw of Lottie field. Section 37-6s-8e. **Discovery Data:** Field by The Texas Co.'s V. J. Kursweg et al 1, completed April 30, 1950. **Structure:** Unknown. **Producing Formation:** Miocene 10,324-330 ft. **Production:** Initial production of discovery well was 336 barrels daily through ¼-in choke. **Producing Wells, March 1, 1950:** 0 with 1 rig running. **Gravity:** 48°. **Deepest Test:** The Texas Co.'s V. J. Kurzweg et al 1, at 11,011 ft in Miocene. **Oil Outlet:** Unknown. **Principal Leaseholder:** The Texas Co. **Remarks:** Discovery well was one of unusually large potentiality.

UNNAMED

2 mi w of Lottie Townsite, 1½ mi nw of Fordoche field. Section 30-5s-8e. **Discovery Data:** Field by The Texas Co.'s Lillie Boudreaux et al 1, completed March 9, 1950. **Structure:** Unknown. **Producing Formation:** Miocene 7981-86 ft. **Production** Initial production of discovery well was 206 barrels daily through ⅛-in choke. **Producing Wells, March 1, 1950:** 0 with 1 rig running. **Gravity:** 38.8°. **Deepest Test:** The Texas Co.'s Lillie Boudreaux et al 1, at 10,002 ft in Miocene. **Oil Outlet:** Unknown. **Principal Leaseholder:** The Texas Co.

UNNAMED

3½ mi w of Erwinville Townsite, 8 mi n of Rosedale field. Section 20-6s-10e. **Discovery Data:** Field by Sinclair Oil & Gas Co.'s H. M. Kimbell 1, completed May, 1950. **Structure:** Unknown. **Producing Formation:** Miocene (?) 9205-10 ft. **Production:** Initial production of discovery well was 237 barrels daily through 7/32-in choke. **Producing Wells, March 1, 1950:** 0 with no rigs running. **Gravity:** Crude oil. **Deepest Test:** Sinclair O&G Co.'s H. M. Kimbell 1, at 11,200 ft in Miocene (?). **Oil Outlet:** Unknown. **Principal Leaseholder:** Sinclair O&G Co. **Remarks:** First production in Pointe Coupee Parish by operator other than Texas Co.

RAPIDES PARISH

BIG ISLAND

Sect. 11, 13, 14-4n-3e, 2 mi e Wiley Point. **Discovery Data:** Structure by reflection seismograph. Field by Phillips Petroleum and Carter Oil Co.'s Eota Realty Co. 1, completed Jan. 29, 1942. **Structure:** Deep seated dome. **Producing Formations:** 5149-5154 in Wilcox, Tuscaloosa 9684-9700 ft, 9714-9722 ft. Wilcox 5149-54, 5565-67 ft. Tuscaloosa 9656-9738 ft (2 pays). **Production in 1949:** 51,331 bbls; through 1949: 270,-049 bbls; daily, March 1, 1950: 778 bbls. **Producing Wells, March 1, 1950:** 8 with 1 rig running. **Gravity:** 44.2-48.8°. **Deepest Test:** Union Prod. Co. et al's Belgard 1, 12,010 ft in Paluxy. **Principal Leaseholders:** Union Prod. Co. & H. H. Marr, Renwar, Phillips.

CHENEYVILLE (Bunkie)

Sect. 53-1s-2e. **Discovery Data:** Structure by reflection seismograph. Field by Amerada Petroleum Corp.'s Well 1, completed Nov. 13, 1935. **Structure:** Piercement-type salt dome, among northernmost on Gulf Coast. **Producing Formations:** Cockfield 5395-5440 ft; Sparta 6150-60 ft. **Production in 1949:** 176,769 bbls; through 1949: 6,572,747 bbls; daily, March 1, 1950: 419 bbls. **Producing Wells, March 1, 1950:** 18 with no rigs running. **Gravity:** 44°. **Deepest Test:** J. A. Hafner, Jr.'s Well, Inc. 1, at 10,513 ft in Eocene. **Oil Outlet:** Interstate pipe line to Baton Rouge Ref. **Principal Leaseholders:** Sid Richardson, Amerada.

FLATWOODS (Abandoned)

Sect. 36-5n-5w. **Discovery Data:** Field by Louisiana Land & Exploration Co.'s J. A. Bently 2-A, completed June 28, 1945. **Structure:** Nonpiercement type. **Producing Formations:** Wilcox 6488-94 ft. **Production, total:** 1100 bbls. **Gravity:** 48°. **Deepest Test:** 7802 ft in Wilcox. **Principal Leaseholder:** Louisiana Ld. & Expl. Co. **Remarks:** Abandoned in Aug. 1945.

ST. BERNARD PARISH

KENNILWORTH

E of St. Bernard townsite, Sect. 59-13s-14e. **Discovery Data:** Structure by reflection seismograph, Vendome Petroleum Co., C. L. Thompson, 1938-39. Field by Vendome's Kennilworth 1, completed May 5, 1939. **Structure:** Probably deep dome. **Producing Formations:** Miocene 10,350-90 ft. **Production in 1949:** 3910 bbls; through 1949: 153,102 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** 0 with no rigs running. **Gravity:** 34°. **Deepest Test:** Sun's Robinson Est. 2 at 11,695 ft in Miocene. **Oil Outlet:** Truck. **Principal Leaseholder:** Vendome Petroleum Co.

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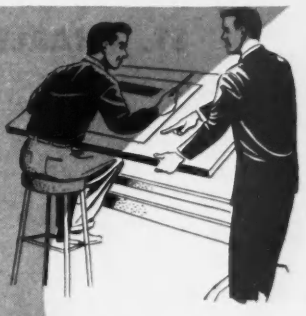

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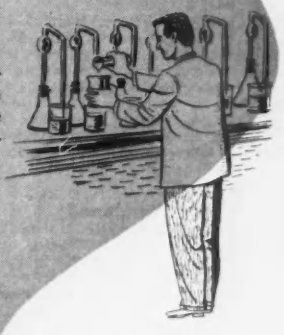

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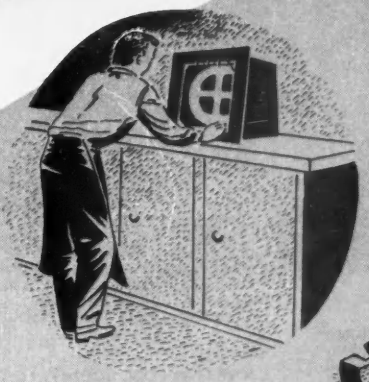

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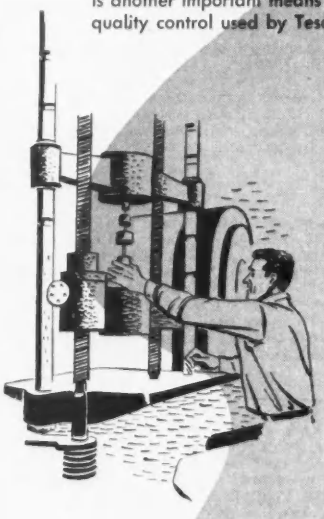

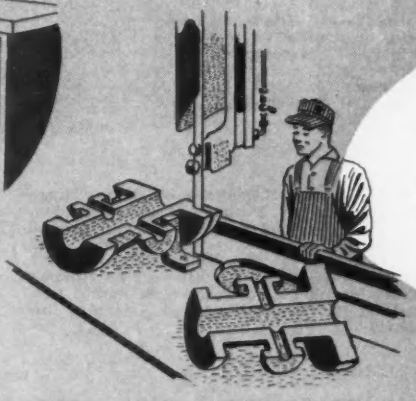

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ST. CHARLES PARISH

BAYOU COUBA

12 mi sw New Orleans, Sect. 12, 13-15s-21e; 18-15s-22e. **Discovery Data:** Structure by reflection and refraction seismograph. Field by Gulf's Delta Securities 1, completed Sept. 19, 1942. **Structure:** Piercement-type salt dome. **Producing Formations:** Miocene 3799-3802, 6250-60, 6440-90 ft. **Production in 1949:** 233,055 bbls; through 1949: 1,205,679 bbls; daily, March 1, 1950: 1209 bbls. **Producing Wells, March 1, 1950:** 10 with 1 rig running. **Gravity:** 35°. **Deepest Test:** Gulf's Delta Securities 18, at 12,722 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Gulf.

BAYOU DES ALLEMANDS

Townships 15, 16s-20e. **Discovery Data:** Structure by reflection and refraction seismograph, Amerada and Louisiana Land, 1935-36. Field by Amerada and Louisiana Land's State 1 completed Aug. 1, 1937. **Structure:** Piercement-type salt dome, salt 7598 ft, structure badly faulted. **Producing Formations:** Miocene 3755-10,410 ft, 10 pays averaging 50 ft thickness. **Production in 1949:** 503,275 bbls; through 1949: 2,549,150 bbls;; daily, March 1, 1950: 1936 bbls. **Producing Wells, March 1, 1950:** 22 with no rigs running. **Gravity:** 32.3-36.6°. **Deepest Test:** W. T. Burton's S. J. Simoneaux 1, at 13,006 ft in Miocene. **Oil Outlets:** Interstate 4-in pipe line and barge. **Principal Leaseholders:** Amerada and Stanolind. **Remarks:** Also in LaFourche Parish. Was called Black Prince Island.

GOOD HOPE

4 mi se Good Hope, Sect. 7-12s-8e. **Discovery Data:** Structure by Shell's reflection seismograph. Field by Pure Oil Co.'s General American Transportation Co. 1, completed August 25, 1944. **Structure:** Deep seated, faulted dome. **Producing Formations:** Miocene 7600-9251 ft (4 pays). **Production in 1949:** 2,175,916 bbls; through 1949: 9,251,199 bbls; daily, March 1, 1950: 6134 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 35-45.7°. **Deepest Test:** Pure's GATX 4, 11,259 ft in Miocene. **Oil Outlet:** Shell and Pan American pipe line. **Principal Leaseholders:** Shell, Pure, Humble, J. R. Frankel.

HAHNVILLE (Abandoned)

6 mi nw of Hahnville, Twp. 12s-20e. **Discovery Data:** Structure by reflection seismograph. Field by Union of California's Milliken & Farwell 1, completed Feb. 15, 1946. **Structure:** Probable deep dome. **Producing Formations:** Miocene 8770-86 ft. **Production, Total:** 4000 bbls. **Gravity:** 39.3°. **Deepest Test:** Wm. Helis' Milliken & Farwell 2, at 10,024 ft in Miocene. **Principal Leaseholders:** Union, Gulf, Wm. Helis. **Remarks:** Abandoned in 1947.

LAKE SALVADOR

In middle of Lake Salvador, Twp. 16s-22e. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s State 1, completed Sept. 20, 1940. **Structure:** Probable deep seated dome. **Producing Formations:** Miocene 9554-10,900 ft (6 pays). **Production in 1949:** 1,841,232 bbls; through 1949: 12,243,109 bbls; daily, March 1, 1950: 5536 bbls. **Producing Wells, March 1, 1950:** 29 with no rigs running. **Gravity:** 33-36°. **Deepest Test:** Humble's State-Lake Salvador 1, at 12,315 ft in Miocene. **Oil Outlets:** Barge and Texas Co. 6-in pipe line. **Principal Leaseholder:** Texas Co.

PARADIS

Township 14s-20e. **Discovery Data:** Structure by reflection seismograph, Texas Co. 1938. Field by Texas Co.'s LLE-Paradis 1, completed June 26, 1939. **Structure:** Believed deep dome. **Producing Formations:** Miocene 9,620-11,130 ft, 7 sands averaging 50 ft thickness. **Production in 1949:** 3,697,748 bbls; through 1949: 30,380,893 bbls; daily, March 1, 1950: 9865 bbls. **Producing Wells, March 1, 1950:** 78 with no rigs running. **Gravity:** 37-52°. **Deepest Test:** Texas Co.'s Sunset Realty & Planting Co. 20, at 13,760 ft in salt. **Oil Outlet:** Texas 8-in pipe line. **Principal Leaseholder:** Texas Co.

ST. JAMES PARISH

BURTON (Distillate)

Sect. 51-12s-15e. **Discovery Data:** Field by Humble O&R Co.'s Burton-Swartz Land Corp. 2, completed Aug. 26, 1949. **Producing Formations:** Miocene 10,838-48 ft. **Production in 1949:** 3811 bbls; through 1949: 3811 bbls; daily, March 1, 1950: 1 bbl. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 52.4°. **Deepest Test:** Discovery well at 11,450 ft in Miocene. **Oil Outlet:** Truck. **Principal Leaseholder:** Humble.

COLLEGE POINT—ST. JAMES (Distillate)

2 mi se Convent, Sect. 31-12s-4e. **Discovery Data:** Structure by reflection seismograph. Field by Humble's Rena R. Keller 1, completed June 27, 1944. **Structure:** Possible deep seated dome. **Producing Formations:** Miocene 10,664-10,690, 10,758-83 ft. **Production in 1949:** 97,699 bbls; through 1949: 641,605 bbls; daily, March 1, 1950: 255 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 46-48.5°. **Deepest Test:** 11,335 ft in Miocene. **Oil Outlet:** Tank car to Baton Rouge. **Principal Leaseholders:** Humble and Gulf. **Remarks:** Includes St. James field.

CONVENT (Hester-Vacherie)

Townships 11, 12s-5e; 13s-17e. **Discovery Data:** Structure by reflection seismograph, torsion balance, Shell, 1935, later geophysical work by Continental. Field by Continental and Shell's Realty 1, completed Aug. 1, 1938. **Structure:** Piercement-type salt dome, salt 7492 ft. **Producing Formations:** Miocene 5618-11,098 ft, 4 sands averaging 30 ft thickness. **Production in 1949:** 164,145 bbls; through 1949: 1,042,712 bbls; daily, March 1, 1950: 520 bbls. **Producing Wells, March 1, 1950:** 14 with 1 rig running. **Gravity:** 36-48°. **Deepest Test:** Texas Co.'s Realty Operators 2, at 14,413 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Shell, Continental, R. T. McDermott. **Remarks:** This field has been called Vacherie and Hester.

LA PICE

Township 12s-15e. **Discovery Data:** Structure by reflection seismograph and torsion balance, Shell, 1937-38. Field by Shell's Schexnayder 1, completed June 2, 1939. **Structure:** Deep seated dome. **Producing Formation:** Miocene 6800-11,000 ft, 8 sands averaging 55 ft thickness. **Production in 1949:** 937,610 bbls; through 1949: 5,134,306 bbls; daily, March 1, 1950: 2526 bbls. **Producing Wells, March 1, 1950:** 22 with no rigs running. **Gravity:** 37-53°. **Deepest Test:** 11,851 ft in Miocene. **Oil Outlets:** Shell 4-in pipe line, barge to Shell Norco refinery; United Gas 6-in (gas). **Principal Leaseholders:** Shell, Humble, R. R. Frankel et al.

ST. JAMES

9 mi sw Lutcher, Sect. 8-12s-16e. **Discovery Data:** Structure by reflection seismograph, Humble in 1938. Field by Humble Oil and Refining Co.'s Panno & Bosetta, Inc., 1, (gas distillate) completed April 18, 1943. **Structure:** Deep seated dome. **Producing Formation:** Basal Miocene 10,763-783 ft. **Production:** Combined with College Point field. **Gravity:** 54°. **Deepest Test:** 11,335 ft in Miocene. **Oil Outlet:** Tank car to Baton Rouge. **Principal Laeseholders:** Humble, Gulf, Shell. **Remarks:** Combined with College Point field in 1946.

ST. JOHN THE BAPTIST PARISH

LA PLACE (Distillate)

Sect. 12-11s-7e. **Discovery Data:** Structure by reflection seismograph, torsion balance, Shell, 1937. Field by Pan American's Mill 1, completed Nov. 25, 1939. **Structure:** Deep seated dome. **Producing Formation:** Miocene 8119-8209 ft. **Production in 1949:** 43,187 bbls; through 1949: 711,906 bbls; daily, March 1, 1950: 103 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 54°. **Deepest Test:** Atlantic Ref. Co.'s Lutcher-Moore 3-A at 11,154 ft in Miocene. **Oil Outlet:** Shell and Pan American 6-in pipe line. **Principal Leaseholders:** Pan American, Shell, Atlantic Refining Co.

RESERVE

Sect. 33-10s-6e. **Discovery Data:** Structure by reflection seismograph. Field by Atlantic Refining Co.'s Lutcher-Moore B-1 completed Jan. 6, 1945. **Structure:** Probable deep dome faulted. **Producing Formation:** Frio 10,254-266 ft. **Production in 1949:** 11,757 bbls; through 1949: 170,953 bbls; daily, March 1, 1950: 58 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 43°. **Deepest Test:** Atlantic Ref. Co.'s Lutcher-Moore 3-B, 13,477 ft in Oligocene. **Principal Leaseholder:** Atlantic Refining Co. **Remarks:** This structure discovered as the result of 1½ years detailing in difficult, swampy terrain.

CANKTON (Distillate)

Ne of Bosco, Twp. 8s-3e. **Discovery Data:** Structure by reflection seismograph, Superior, Shell, 1935, and by surface indications. Field by Superior's A. Savoie 1, completed Dec. 23, 1936. **Structure:** Probable deep seated dome. **Producing Formation:** Miocene 5316-10,600 ft (4 pays). **Production in 1949:** 10,428 bbls; through 1949: 59,462 bbls; daily, March 1, 1950: 25 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 36-48°. **Deepest Test:** Superior's J. J. Credeur et al 1, at 11,293 ft in Miocene. **Oil Outlet:** Interstate pipe line. **Principal Leaseholders:** Superior, Shell and Sun.

CANKTON, NORTH

¾ mi ne Cankton field, Twps. 8s-3, 4e. **Discovery Data:** Structure by reflection seismograph, Shell prior to 1936. Field by Sun Oil Co.'s E. M. Boagni Est. 1-B, completed April 18, 1944. **Structure:** Faulting in regional uplift. **Producing Formation:** Miocene 2788-11,000 ft (7 pays). **Production in 1949:** 837,655 bbls; through 1949: 3,001,322 bbls; daily, March 1, 1950: 2389 bbls. **Producing Wells, March 1, 1950:** 25 with 1 rig running. **Gravity:** 22-54°. **Deepest Test:** 11,495 ft in Miocene. **Oil Outlets:** Interstate 8-in pipe line to Baton Rouge, Danciger gas pipe line. **Principal Leaseholders:** Sun, Shell, Gulf, Danciger, Atlantic, Tide Water, Superior, Hunt Oil.

KROTZ SPRINGS

2 mi from Krotz Springs, Sect. 21-6s-7e. **Discovery Data:** Structure by reflection seismograph. Field by Gulf's Haas & Hirsch 1-E, completed Dec. 27, 1942. **Structure:** Probable deep seated dome. **Producing Formations:** Miocene 6822-9373 ft, Cockfield 10,100-163 ft. **Production in 1949:** 173,259 bbls; through 1949: 399,599 bbls; daily, March 1, 1950: 790 bbls. **Producing Wells, March 1, 1950:** 11 with 2 rigs running. **Gravity:** 36-69°. **Deepest Test:** Discovery well at 12,298 ft in Wilcox. **Oil Outlet:** Interstate pipe line to Baton Rouge. **Principal Leaseholders:** Gulf, Humble, Texas Co.

LEWISBURG, NORTH

4 mi nw of Shuteston, Sect. 9-7s-3e. **Discovery Data:** Field by Atlantic Refining Co.'s Albert Meche 1, completed Aug. 11, 1949. **Producing Formation:** Miocene 9474-82 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 56.5°. **Deepest Test:** Discovery well at 9898 ft in Miocene. **Principal Leaseholder:** Atlantic.

MELVILLE

3½ mi se of Melville, Sect. 23-4s-7e. **Discovery Data:** Structure by reflection seismograph. Field by Sun Oil Co.'s Swift 1, completed Nov., 1948. **Structure:** Fault. **Producing Formation:** Wilcox 11,240-50 ft. **Production in 1949:** 10,784 bbls; through 1949: 12,500 bbls; daily, March 1, 1950: 9 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 54.8°. **Deepest Test:** Discovery well at 12,500 ft in Wilcox. **Oil Outlet:** Interstate pipe line. **Principal Leaseholder:** Sun Oil Co.

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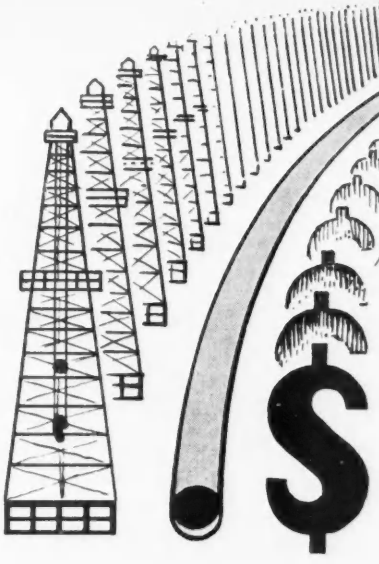

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PORT BARRE

Township 6s-5e. **Discovery Data:** Structure by refraction seismograph, Gulf, 1926, Texas Co. reflection seismograph in 1939. Field by Texas Co.'s Botany Bay Lbr. Co. 1, completed Feb. 23, 1929. **Structure:** Piercement-type salt dome, cap rock 3551 ft, salt 3831 ft. **Producing Formations:** Miocene 3100-3680 ft, Eocene 5116-9480 ft. **Production in 1949:** 1,456,183 bbls; through 1949: 20,066,705 bbls; daily, March 1, 1950: 3781 bbls. **Producing Wells, March 1, 1950:** 76 with no rigs running. **Gravity:** 21-60°. **Deepest Test:** 11,751 ft in Eocene. **Oil Outlet:** Interstate 6-in pipe line. **Principal Leaseholders:** Texas Co., Gulf, Pan American, Wm. Helis, Grubb & Hawkins, McDannald Oil.

SAVOY

6 mi e of Eunice, Sect. 25-6s-1e. **Discovery Data:** Structure by reflection seismograph. Field by Stanolind O&G Co.'s E. Guillory 1, completed Jan. 14, 1947. **Structure:** Anticline. **Producing Formation:** Oligocene 8950-65 ft. **Production in 1949:** 59,874 bbls; through 1949: 101,334 bbls; daily, March 1, 1950: 315 bbls. **Producing Wells, March 1, 1950:** 4 with 1 rig running. **Gravity:** 44-48°. **Deepest Test:** 9866 ft in Vicksburg. **Oil Outlet:** Interstate pipe line to Baton Rouge. **Principal Leaseholder:** Stanolind.

SHUTESTON

2 mi nw of Sunset, Sect. 37-7s-4e. **Discovery Data:** Structure by reflection seismograph in early 1930's. Field by Sun Oil Co.'s Burleigh-Pool 1, completed March 11, 1943. **Structure:** Deep seated dome. **Producing Formation:** Lower Miocene 9495-10,383 ft. **Production in 1949:** 313,504 bbls; through 1949: 1,183,239 bbls; daily, March 1, 1950: 920 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 38.4-50.1°. **Deepest Test:** 11,508 ft in Vicksburg. **Oil Outlet:** Interstate pipe line to Baton Rouge. **Principal Leaseholders:** Sun, Stanolind, Atlantic.

SHUTESTON, SOUTH

13 mi nw of Lafayette, Sect. 6-8s-4e. **Discovery Data:** Structure by reflection seismograph. Field by Sun Oil Co.'s A. M. Darby 1, completed July, 1946. **Structure:** Faulted anticline. **Producing Formations:** Frio 9965-85, 10,013-17 ft. **Production in 1949:** 152,105 bbls; through 1949: 214,023 bbls; daily, March 1, 1950: 642 bbls. **Producing Wells, March 1, 1950:** 11 with no rigs running. **Gravity:** 40-53°. **Deepest Test:** Sun's C. F. Boagni 1, at 10,971 ft in Oligocene. **Oil Outlet:** Interstate pipe line. **Principal Leaseholders:** Sun, Stanolind, British American.

ST. MARTIN PARISH

ANSE LA BUTTE

Twp. 9s-5e. **Discovery Data:** Structure by elevation, gas seeps, paraffin beds. Field by Heywood Bros.' Fee 1, completed 1902. **Structure:** Piercement-type salt dome, salt 240 ft, cap rock missing. **Producing Formations:** Pliocene 1065-1820 ft (3 pays), Miocene 2340-11,000 ft (16 pays). **Production in 1949:** 2,165,090 bbls; through 1949: 21,942,505 bbls; daily, March 1, 1950: 6305 bbls. **Producing Wells, March 1, 1950:** 82 with no rigs running. **Gravity:** 18-40°. **Deepest Test:** 11,925 ft in Oligocene. **Oil Outlet:** Interstate pipe lines and truck. **Principal Leaseholders:** Stanolind, Louisiana-Florida Pet., Hunter Co., Moresi Lease Management, Inc. **Remarks:** Also lies in Lafayette Parish.

ARNAUDVILLE (Distillate)

1 mi w of Arnaudville, Twp. 8s-5e. **Discovery Data:** Structure by Shell's torsion balance and reflection seismograph survey in 1935-36. Field by Amerada's Bertinot-Quebedeaux 1, completed Dec. 9, 1943. **Structure:** Deep seated, faulted dome. **Producing Formations:** Miocene 9914-54 ft. Frio, 10,347-11,075 ft. **Production in 1949:** 13,271 bbls; through 1949: 29,158 bbls; daily, March 1, 1950: 18 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 38-48°. **Deepest Test:** Shell's Hefea 2, at 11,432 ft in Oligocene. **Oil Outlet:** Trucks. **Principal Leaseholders:** Amerada, Shell, Pan American, Tide Water, Gravis & Mitchell & Bankhead.

ARNAUDVILLE, SOUTH (Distillate)

Sect. 38-8s-5e. **Discovery Data:** Field by The Union Sulphur Co.'s Hefea Land Co. 1, completed March 8, 1949. **Producing Formation:** Oligocene 11,059-78 ft. **Production in 1949:** 5176 bbls; through 1949: 5176 bbls; daily, March 1, 1950: 18 bbls. **Producing Wells, March 1, 1950:** 1 with 1 rig running. **Gravity:** 47°. **Deepest Test:** Discovery well at 11,700 ft in Oligocene. **Oil Outlet:** Trucks. **Principal Leaseholder:** Union Sulphur.

BAYOU BOUILLON (Gas)

Sect. 13, 24-9s-8e; 18, 19-9s-9e. **Discovery Data:** Structure by surface indications, gas seeps. Field by O. W. Heywood et al's 2, completed 1902. **Structure:** Piercement-type salt dome, cap rock 1030 ft, salt 1609 ft. **Producing Formations:** Pliocene 3200-15 ft, Miocene 7487-7500 ft. **Production in 1949:** None; through 1949: 628,600 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 20°. **Deepest Test:** Gulf's McGrief 1 at 12,789 ft in Miocene. **Principal Leaseholder:** Transcontinental Oil Corp. **Remarks:** This is one of the oldest known domes in coastal La. First commercial well was Rycade Oil Corp.'s Bayou Bouillon 2-B, completed July, 1928.

DUCK LAKE

4 mi sw of West Lake Verret field, Sect. 1-15s-11e. **Discovery Data:** Field by Humble O&R Co.'s Atchafalaya Ld. Co. 1, completed Jan. 6, 1949. **Producing Formations:** Frio 11,470-75, 11,642-52, 12,404-07 ft. **Production in 1949:** 104,295 bbls; through 1949: 104,295 bbls; daily, March 1, 1950: 430 bbls. **Producing Wells, March 1, 1950:** 5 with 3 rigs running. **Gravity:** 33-36.2° and dist. **Deepest Test:** Hunt Oil Co. et al's St. Lse. 1392-Goodrich Unit 1, at 13,595 ft. **Oil Outlet:** Trucks. **Principal Leaseholders:** Humble, Arkansas Fuel Oil Co.

HAPPYTOWN

Sect. 86-7s-5e. **Discovery Data:** Structure by reflection seismograph, Shell, 1938. Field by Shell's Iberville Land Co. 1, completed Nov. 1, 1939. **Structure:** Deep seated dome. **Producing Formation:** Miocene 9745-78 ft. **Production in 1949:** 19,516 bbls; through 1949: 885,926 bbls; daily, March 1, 1950: Shut in. **Producing Wells, March 1, 1950:** 2 (shut in) with no rigs running. **Gravity:** 41°. **Deepest Test:** 11,012 ft in Miocene. **Oil Outlets:** Shell 4-in pipe line and barge. **Principal Leaseholder:** Shell.

LAKE CHICOT

6 mi se of Bayou Chene. **Discovery Data:** Structure by reflection seismograph. Field by Amerada and Phillips' Arm of Grand Lake-State Lease 411-1, completed Sept. 11, 1941. **Structure:** Deep seated dome. **Producing Formation:** Miocene 7200-10,347 ft (5 pays). **Production in 1949:** 1,083,166 bbls; through 1949: 6,920,884 bbls; daily, March 1, 1950: 2907 bbls. **Producing Wells, March 1, 1950:** 24 with no rigs running. **Gravity:** 31-60°. **Deepest Test:** 11,982 ft in Miocene. **Oil Outlets:** Interstate 6-in pipe line and barge. **Principal Leaseholder:** Amerada.

LAKE MONGOULOIS

In Lake Mongoulois, Twp. 10s-9e. **Discovery Data:** Structure by torsion balance, Calcasieu Oil Co., in 1927; geophysics, Texas Co., 1934. Field by Texas Co.'s State 6, completed Dec. 26, 1938. **Structure:** Deep seated dome. **Producing Formations:** Miocene 9775-11,008 ft (4 pays). **Production in 1949:** 656,415 bbls; through 1949: 1,997,851 bbls; daily, March 1, 1950: 1955 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 25-54°. **Deepest Test:** Texas Co.'s State Lake Mongoulois 7 at 11,117 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co.

PLUMB BOB BAY

Sect. 15, 16, 20, 21-8s-7e. **Discovery Data:** Structure by reflection seismograph, Texas Co., 1934. Field by Texas Co.'s St. Martin Land Co. 12, completed Sept. 9, 1939. **Structure:** Deep seated salt dome, salt 8848 ft. **Producing Formation:** Miocene 4045-9975 ft (5 pays). **Production in 1949:** 174,494 bbls; through 1949: 1,311,083 bbls; daily, March 1, 1950: 399 bbls. **Producing Wells, March 1, 1950:** 8 with no rigs running. **Gravity:** 25.7-34°. **Deepest Test:** 11,194 ft in Miocene. **Oil Outlet:** Texas Co. 4-in pipe line to barge. **Principal Leaseholder:** Texas Co.

ST. MARTINVILLE

Townships 10, 11s-6e. **Discovery Data:** Structure by torsion balance, reflection seismograph and surface geology, Tide Water in 1934, 1935. Field by Tide Water's Smede 1, completed Nov. 4, 1935. **Structure:** Deep dome. **Producing Formation:** Miocene 2370-10,215 ft (7 pays). **Production in 1949:** 222,675 bbls; through 1949: 2,313,185 bbls; daily, March 1, 1950: 624 bbls. **Producing Wells, March 1, 1950:** 27 with no rigs running. **Gravity:** 23.5-51°. **Deepest Test:** 12,375 ft in Miocene. **Oil Outlet:** Interstate 3-in pipe line to Baton Rouge. **Principal Leaseholders:** Tide Water, Continental, R. P. Phillips.

SECTION 28

Sect. 21, 27, 28, 29, 31, 32, 33-9s-7e. **Discovery Data:** Structure by surface indications of gas, paraffin dirt, surface geology, 1917. Field by Superior Oil Co.'s Stuart 1, completed Dec. 22, 1940. **Structure:** Piercement-type salt dome. **Producing Formation:** Miocene 4831-11,132 ft (8 pays). **Production in 1949:** 1,095,258 bbls; through 1949: 2,365,882 bbls; daily, March 1, 1950: 3692 bbls. **Producing Wells, March 1, 1950:** 30 with 2 rigs running. **Gravity:** 26-50°. **Deepest Test:** 13,141 ft in Miocene. **Oil Outlet:** Gulf 4-in pipe line. **Principal Leaseholders:** Superior, Gulf, Stanolind, Shell, Freeport Sulphur, Callery & Hurt. **Remarks:** Previous to discovery 17 dry holes were drilled on dome. Also known as Hager.

WEST LAKE VERRETT

Sect. 9, 10, 11, 14, 15, 16, 22-14s-12e. **Discovery Data:** Structure by reflection seismograph and torsion balance, Shell, Tide Water, 1936 and 1937. Field by Shell's Burdin 1, completed Dec. 3, 1938. **Structure:** Believed deep dome. **Producing Formation:** Miocene 1302-11,490 ft (10 pays). **Production in 1949:** 1,391,510 bbls; through 1949: 9,951,064 bbls; daily, March 1, 1950: 3989 bbls. **Producing Wells, March 1, 1950:** 42 with no rigs running. **Gravity:** 24-37°. **Deepest Test:** 12,244 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Shell.

ST. MARY PARISH

BATEMAN LAKE (Berwick)

South of Morgan City, Sect. 16, 21-16s-12e. **Discovery Data:** Structure by reflection seismograph, Louisiana Land Co., 1929; Texas Co., 1935. Field by Texas Co.'s State-Bateman Lake 1, completed Dec. 24, 1937. **Structure:** Deep seated dome, faulted. **Producing Formation:** Miocene 8675-10,930 ft, 6 sands averaging 45 ft thickness. **Production in 1949:** *482,874 bbls; through 1949: *5,005,846 bbls; daily, March 1, 1950: *1366 bbls. **Producing Wells, March 1, 1950:** 4 (oil) with no rigs running. **Gravity:** 33-60°. **Deepest Test:** Texas Co.'s Woodward-Kepper-Longmire 7, at 12,273 ft in Miocene. **Oil Outlets:** Texas Co. 8-in pipe line and barge. **Principal Leaseholder:** Texas Co. **Remarks:** *Includes recycling plant distillate production, which amounted to 1036 bbls daily on March 1, 1950.

BAYOU CARLIN

4 mi nw Bayou Sale field, Twp. 16s-8e. **Discovery Data:** Structure by reflection seismograph. Field by Humble Oil & Refining Co.'s Miami Corp. 1-H, completed July 31, 1945. **Structure:** Dome. **Producing Formation:** Miocene 11,600-23 ft. **Production in 1949:** 98,221 bbls; through 1949: 503,677 bbls; daily, March 1, 1950: 300 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 35°. **Deepest Test:** Humble's Kearney 1, at 12,700 ft in Miocene. **Oil Outlet:** Interstate 4-in pipe line. **Principal Leaseholder:** Humble.

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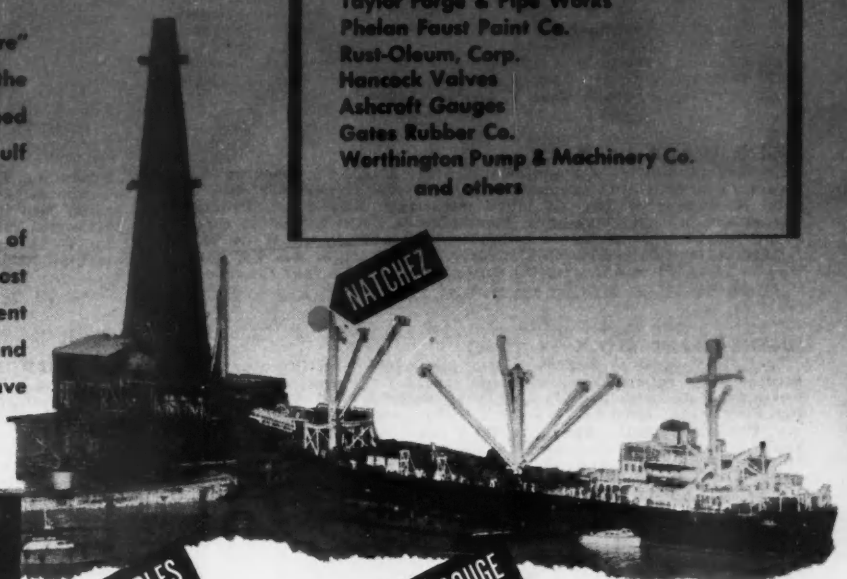

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BAYOU SALE

Townships 16, 17s-9e, partly in E. Cote Blanch Bay. **Discovery Data:** Structure by reflection seismograph, Humble, 1937. Field by Humble's E. Marin 1, completed April 4, 1941. **Structure:** Deep seated dome. **Producing Formation:** Miocene 4541-10,720 ft, 5 sands averaging 40 ft thickness. **Production in 1949:** 4,993,609 bbls; through 1949: 27,128,140 bbls; daily, March 1, 1950: 14,073 bbls. **Producing Wells, March 1, 1950:** 72 with no rigs running. **Gravity:** 32.8-50.5°. **Deepest Test:** 13,063 ft in Miocene. **Oil Outlet:** Interstate 4 and 6-in pipe lines. **Principal Leaseholders:** Humble, Texas and Atlantic.

BELLE ISLE

7 mi se Horseshoe Bayou field, Twp. 17s-10e. **Discovery Data:** Structure by surface indications, elevation above marsh. Capt. A. F. Lucas found rock salt in first test at 373 ft December, 1896. Field by Sun's Belle Isle 1, completed April 4, 1941. **Structure:** Piercement-type salt dome, cap rock 145 ft, salt 150 ft. **Producing Formation:** Miocene 3428-9870 ft (6 pays). **Production in 1949:** 217,321 bbls; through 1949: 521,698 bbls; daily, March 1, 1950: 687 bbls. **Producing Wells, March 1, 1950:** 7 with 2 rigs running. **Gravity:** 36-47°. **Deepest Test:** Texas Co.'s State-Atchafalaya Bay Lse. 340-6, at 15,549 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Sun Oil Co., Texas Co.

CHARENTON

East of Charenton and Jeanerette, Twps. 13, 14s-9, 10e. **Discovery Data:** Structure by gas seepage, sulphur water, paraffin beds. Torsion balance, Texas Co. and others. Reflection seismograph, Petty Exploration Co., 1934, for Harry Hanszen. Field by Mike Hogg and Harry Hanszen's Lawes Realty Co. 1, completed Sept. 6, 1936. **Structure:** Deep seated dome. **Producing Formations:** Pliocene 1102-38, 1312-21 ft, Miocene 1846-9243 ft (12 pays). **Production in 1949:** 1,510,604 bbls; through 1949: 18,798,787 bbls; daily, March 1, 1950: 4119 bbls. **Producing Wells, March 1, 1950:** 112 with 1 rig running. **Gravity:** 22-39°. **Deepest Test:** 11,920 ft in Miocene. **Oil Outlet:** 4-mi 2½-in pipe line to Bayou Teche then barge. **Principal Leaseholders:** Pan American, Fifteen Oil Co., Atlantic Oil Co., W. H. Talbot, Lynn Oil Co.

COTE BLANCHE ISLAND

12 mi w of Franklin, in W. Cote Blanche Bay, Twp. 15s-7e. **Discovery Data:** Structure by reflection seismograph. Field by Texas Co.'s State-Cote Blanche Island Lse. 340-12, completed May, 1948. **Structure:** Salt dome. **Producing Formations:** Miocene 13,300-58 ft. **Production in 1949:** 4878 bbls; through 1949: 5900 bbls; daily, March 1, 1950: none. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 56.8°. **Deepest Test:** Discovery well at 13,824 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co.

EUGENE ISLAND BLOCK 32

In Gulf of Mexico, Eugene Island Area, Block 32. **Disovery Data:** Structure by reflection seismograph. Field by Pure Oil Co.'s State Lse. 832-1-A, completed Dec. 12, 1949. **Structure:** Salt dome. **Producing Formation:** Miocene 9629-28 ft. **Production in 1949:** 2011 bbls; through 1949: 2011 bbls; daily, March 1, 1950: 65 bbls. **Producing Wells, March 1, 1950:** 1 with 2 rigs running. **Gravity:** 37°. **Deepest Test:** Discovery well at 12,424 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Pure Oil Co.

EUGENE ISLAND BLOCK 51 (Gas)

In Gulf of Mexico. Eugene Island Area, Block 51. **Discovery Data:** Structure by reflection seismograph. Magnolia Petroleum Co.'s State Lease 843-1-B, completed Jan. 23, 1950. **Structure:** Salt dome. **Producing Formation:** Miocene 9449-51 ft. **Production:** Shut in since discovery. **Producing Wells, April 1, 1950:** 1 (shut in) with no rigs running. **Deepest Test:** Magnolia Petroleum Co.'s State Lease 843-1-B, at 14,048 ft in Miocene. **Oil Outlet:** None. **Principal Leaseholder:** Magnolia Petroleum Co. **Remarks:** Discovery well flowed 1,400,000 cubic feet of dry gas through ⅛-in choke. Deeper test at 11,359-61 ft had show of distillate.

EUGENE ISLAND BLOCK 126

25 mi in Gulf of Mexico. Eugene Island Area, Block 126. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Petroleum Co.'s State Lease 694-1-A, completed April 15, 1950. **Structure:** Salt dome. **Producing Formation:** Miocene 11,648-58 ft. **Production:** Initial production of discovery well was 614 barrels daily through 12/64-in choke. **Producing Wells, March 1, 1950:** 0 with 1 rig running. **Gravity:** 34.4°. **Deepest Test:** Magnolia Petroleum Co.'s State Lease 694-1-A, at 11,672 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Magnolia Petroleum Co. **Remarks:** This discovery extends tidelands oil production to its farthest point out into the Gulf.

HORSESHOE BAYOU

Township 17s-9e. **Discovery Data:** Structure by refraction seismograph, Pure, 1929; reflection seismograph, Texas Co., 1935. Field by Texas Co.'s Horseshoe Bayou 1, completed Aug. 12, 1937. **Structure:** Deep seated dome. **Producing Formation:** Miocene 9980-12,004 ft (6 pays). **Production in 1949:** 1,177,662 bbls; through 1949: 6,166,359 bbls; daily, March 1, 1950: 3655 bbls. **Producing Wells, March 1, 1950:** 16 with no rigs running. **Gravity:** 38-46°. **Deepest Test:** 12,770 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co.

JEANERETTE

Sect. 38, 39, 40, 41-13s-9e; 59-13s-8e. **Discovery Data:** Structure by surface indications. Reflection seismograph, Petty Exploration Co., 1935, for Perry Scranton, Harry Hanszen and W. C. Hertel. Field by Hertel Oil Co.'s Roane 1, compled Dec. 23, 1935. **Structure:** Deep dome, faulted. **Producing Formation:** Miocene 6498-11,460 ft, 6 sands averaging 30 ft thickness. **Production in 1949:** 179,436 bbls; through 1949: 12,744,141 bbls; daily, March 1, 1950: 333 bbls. **Producing Wells, March 1, 1950:** 17 with no rigs running. **Gravity:** 35-38°. **Deepest Test:** 11,634 ft in Miocene. **Oil Outlet:** Interstate 6-in pipe line. **Principal Leaseholders:** Herton Oil Co., Atlantic Ref. Co.

JEANERETTE, NORTH

5 mi e of Jeanerette, Sect. 19, 57-13s-9e. **Discovery Data:** Structure by reflection seismograph, Atlantic Refining Co. in 1942. Field by Atlantic's Adaline Sugar 1, completed May 25, 1943. **Structure:** Deep seated, faulted dome. **Producing Formations:** Miocene 11,398-482, 11,875-95, 11,917-40 ft. **Production in 1949:** 115,974 bbls; through 1949: 577,956 bbls; daily, March 1, 1950: 308 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 34-50.5°. **Deepest Test:** Atlantic Refining Co.'s Teche Sugar 1, at 12,992 ft in Miocene. **Oil Outlet:** Interstate pipe line to Baton Rouge. **Principal Leaseholder:** Atlantic Refining Co.

JEANERETTE, SOUTH

Sect. 37-13s-9e. **Discovery Data:** Field by Atlantic Refining Co.'s Blanchard 1, completed Aug., 1945. **Structure:** Faulted dome. **Producing Formations:** Miocene 3210-20, 5064-67, 6290-96, 6524-34, 7144-78, 7464-84 ft. **Production in 1949:** 578,014 bbls; through 1949: 1,031,454 bbls; daily, March 1, 1950: 1737 bbls. **Producing Wells, March 1, 1950:** 10 with no rigs running. **Gravity:** 32.5-37°. **Deepest Test:** 11,027 ft in Miocene. **Oil Outlet:** Interstate pipe line. **Principal Leaseholders:** Atlantic, Lyons & Prentiss, J. P. Owens.

WEST COTE BLANCHE BAY

Twps. 15, 16s-6, 7e, in West Cote Blanche Bay. **Discovery Data:** Structure by geophysics, Texas Co., 1938. Field by Texas Co.'s State Lse. 340-1, completed March, 1940. **Structure:** Piercement-type salt dome. **Producing Formation:** Miocene 1924-10,969 ft (15 pays). **Production in 1949:** 1,858,951 bbls; through 1949: 8,298,787 bbls; daily, March 1, 1950: 5254 bbls. **Producing Wells, March 1, 1950:** 39 with 1 rig running. **Gravity:** 20.7-55°. **Deepest Test:** Texas Co.'s State-W. Cote Blanche Bay Lse. 340-27, at 11,117 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co.

UNNAMED

Sweet Bay Lake Area, Section 10-17s-12e. **Discovery Data:** Field by Sun Oil Co.'s State Lease 1337-1, completed March 22, 1950. **Structure:** Unknown. **Producing Formation:** Miocene 10,051-56 ft. **Production:** Initial production of discovery well was 120 barrels daily through 7/64-in choke. **Producing Wells, March 1, 1950:** 0 with 1 rig running. **Gravity:** 36°. **Deepest Test:** Sun Oil Co.'s State Lease 1337-1, at 11,775 ft in Miocene. **Oil Outlet:** Unknown. **Principal Leaseholder:** Sun Oil Co.

ST. TAMMANY PARISH

BIG POINT (Distillate)

12 mi sw of Slidell in Lake Pontchartrain, Twp. 9s-12e. **Discovery Data:** Structure by reflection seismograph. Field by Atlantic Refining Co.'s State Lse. 1-A, completed Sept. 23, 1946. **Structure:** Salt dome. **Producing Formation:** Miocene 7180-88 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 51.8°. **Deepest Test:** Discovery well at 11,052 ft in Miocene. **Principal Leaseholder:** Atlantic Refining Co. **Remarks:** Atlantic has made royalty payments to State for shut in well in lieu of additional drilling to hold 5000 acres.

TERREBONNE PARISH

BAY BAPTISTE (Distillate)

3 mi s of Lirette field, Sect. 41-9s-19e. **Discovery Data:** Structure by Fohs reflection seismograph in 1938. Field by Fohs Oil Co.'s State Bay Baptiste 1, completed Aug. 7, 1938. **Structure:** Probably deep seated dome. **Producing Formations:** Miocene 8788-8820, 8955-68, 8984-94, 10,503-11, 11,172-78 ft. **Production in 1949:** 30,545 bbls; through 1949: 83,221 bbls; daily, March 1, 1950: 212 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 49-54.2°. **Deepst Test:** Discovery well at 13,409 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Union Prod. Co.

BAY JUNOP

20 mi sw of Dulac, Sect. 27-21s-14e. **Discovery Data:** Structure by reflection seismograph. Field by Union Oil Co.'s State-LL&E Unit 9-1, completed Aug. 18, 1948. **Structure:** Salt dome. **Producing Formations:** Miocene 3493-98, 4012-62, 4500-04 ft. **Production in 1949:** 2341 bbls; through 1949: 16,151 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 37.7-40.7°. **Deepest Test:** 13,285 ft in Miocene. **Oil Outlet:** Barged to Texas Co. at Port Arthur. **Principal Leaseholder:** Union Oil of Calif.

BAY ST. ELAINE

Townships 22s-17, 18e. **Discovery Data:** Structure by seismograph, Louisiana Land & Exploration Co., 1927. Field by Texas Co.'s State Bay St. Elaine 14, completed July 31, 1937. **Structure:** Piercement-type salt dome, cap rock 710 ft, salt 1463 ft. **Producing Formations:** Miocene 5700-10,194 ft (9 pays averaging 30 ft thickness), 13,718-64 ft. **Production in 1949:** 2,054,738 bbls; through 1949: 6,050,349 bbls; daily, March 1, 1950: 5880 bbls. **Producing Wells, March 1, 1950:** 38 with 1 rig running. **Gravity:** 29-47.3°. **Deepest Test:** Texas Co.'s State-Bay St. Elaine, Lse. 1246-1-c, at 14,137 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co., with sulphur rights subleased to Freeport Sulphur Co. **Remarks:** Known formerly as Bay Coon Road.

BAYOU PENCHANT

14 mi se Morgan City, Sect. 30-18s-14e. **Discovery Data:** Structure by reflection seismograph, Texas Co., in 1938. Field by Superior Oil Co.'s Continental Land & Fur. Co. 1, completed March 6, 1944. **Structure:** Deep seated dome. **Producing Formation:** Miocene 9929-39 ft. **Production in 1949:** None; through 1949: 54,975 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None (2 shut in) with no rigs running. **Gravity:** 44-55°. **Deepest Test:** Superior's Continental Ld. & Fur. Co. 4, at 14,296 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Superior. **Remarks:** No production reported since 1948.

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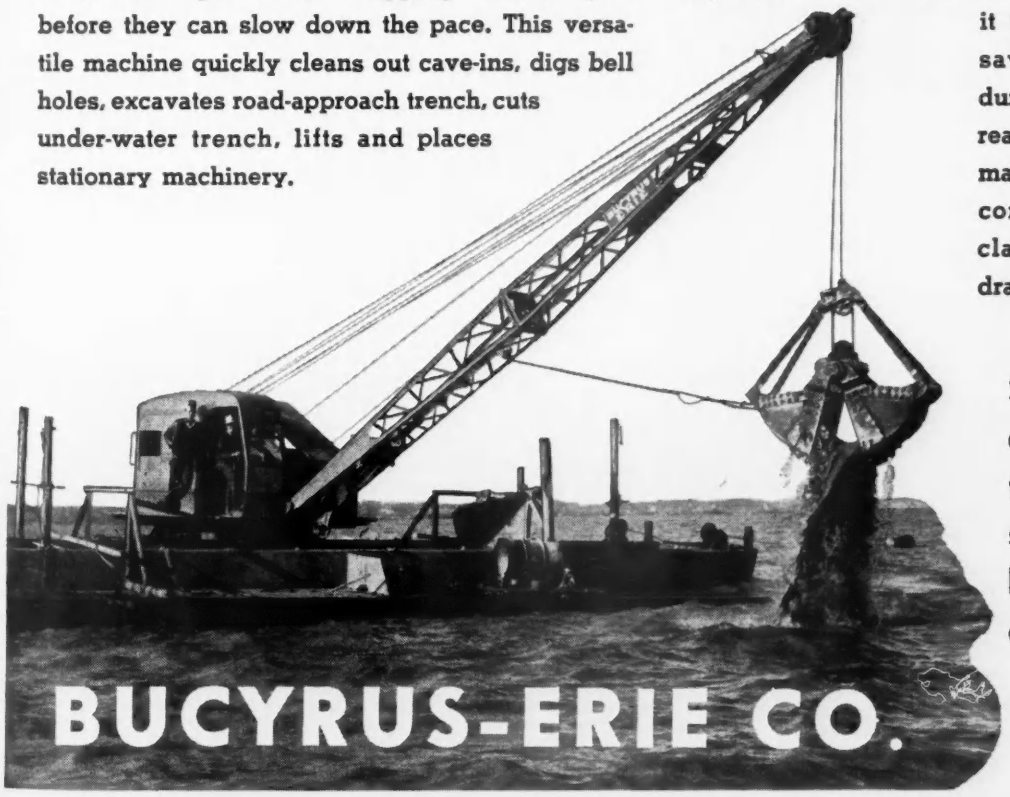

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CAILLOU ISLAND

Townships 23s-19, 20e. **Discovery Data:** Structure by refraction seismograph, Louisiana Land & Exploration Co., 1928. Field by Texas Co.'s Caillou Island 2, completed Jan. 24, 1930. **Structure:** Piercement-type salt dome, cap rock 2471 ft. **Producing Formation:** Miocene 3640-11,872 ft (15 pays). **Production in 1949:** 4,139,050 bbls; through 1949: 51,856,734 bbls; daily, March 1, 1950: 15,448 bbls. **Producing Wells, March 1, 1950:** 84 with 1 rig running. **Gravity:** 35-41.4°. **Deepest Test:** Texas Co.'s State-Caillou Island 77 at 12,060 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co. **Remarks:** Was called Timbalier Bay.

DEER ISLAND (Distillate—Shut In)

14 mi s of Morgan City, Sect. 24-18s-12e. **Discovery Data:** Structure by reflection seismograph. Field by Humble's Continental Land & Fur. Co. 2, completed Sept. 28, 1942. **Structure:** Probable deep seated salt dome. **Producing Formations:** Miocene 9565-90, 10,005-029 ft. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** Dist. **Deepest Test:** 11,470 ft in Miocene. **Principal Leaseholder:** Humble.

DE LARGE (Distillate)

Sect. 77-19s-17e. **Discovery Data:** Structure by reflection seismograph, Fohs Oil Co., 1936 and 1937; soil analysis, 1939. Field by Fohs' Buckley Bourg 1, completed June 18, 1938. **Structure:** Anticline. **Producing Formations:** Miocene 13,230-68 ft, 13,350-89, 13,469-528 ft. **Production in 1949:** 80,444 bbls; through 1949: 1,214,466 bbls; daily, March 1, 1950: 243 bbls. **Producing Wells, March 1, 1950:** 3 with 2 rigs running. **Gravity:** 38-51°. **Deepest Test:** 13,586 ft in Miocene. **Oil Outlets:** Barge, United Gas 4 & 12-in gas pipe line. **Principal Leaseholder:** Union Prod. Co.

DOG LAKE

Townships 21, 22s-15, 16e. **Discovery Data:** Structure by refraction seismograph, Louisiana Land Exploration Co., 1927. Field by Texas Co.'s State Dog Lake Bayou A-1, completed May, 1929. **Structure:** Piercement-type salt dome, cap rock 1470 ft, salt 1730 ft. **Producing Formations:** Miocene 6550-9600 ft (8 pays). **Production in 1949:** 557,322 bbls; through 1949: 6,406,909 bbls; daily, March 1, 1950: 2432 bbls. **Producing Wells, March 1, 1950:** 19 with 1 rig running. **Gravity:** 35-52°. **Deepest Test:** Texas Co.'s State-Dog Lake Lse. 200-11-1, at 12,678 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co. **Remarks:** First commercial well was Texas Co.'s State-Dog Lake 18, completed Dec. 3, 1935.

EUGENE ISLAND BLOCK 58 (Distillate)

In Gulf of Mexico. Block 58, Eugene Island Area. **Discovery Data:** Structure by reflection seismograph. Magnolia Petroleum Co.'s State Lease 673-1-B, completed Jan. 8, 1950. **Structure:** Salt dome. **Producing Formation:** Miocene 11,206-208 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 54°. **Deepest Test:** Magnolia Petroleum Co.'s State Lease 673-1-B, at 13,800 ft in Miocene. **Oil Outlet:** None. **Principal Leaseholder:** Magnolia Petroleum Company.

FOUR ISLE

Sect. 13, 14, 15, 23, 24, 26-21s-16e. **Discovery Data:** Structure by reflection seismograph, Louisiana Land & Exploration Co., 1927. Field by Texas Co.'s LL&E Co.-Four Island 8, completed April 10, 1935. **Structure:** Piercement-type salt dome, cap rock 557 ft, salt 1381 ft. **Producing Formations:** Miocene 5518-70, 8937-94, 9950-65, 11,140-52, 12,210-20, 12,430-49, 12,452-68, 13,455-75 ft. **Production in 1949:** 193,565 bbls; through 1949: 312,890 bbls; daily, March 1, 1950: 1137 bbls. **Producing Wells, March 1, 1950:** 8 with 1 rig running. **Gravity:** 41.2-49.1°. **Deepest Test:** Superior's La. Ld. & Expl. Co. Unit 14-3, at 14,564 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Superior: **Remarks:** Rediscovered by Superior in 1947.

GIBSON

Sect. 17, 18, 20, 30, 40-17s-15e. **Discovery Data:** Structure by reflection seismograph, Barnsdall, Shell, 1936. Field by Shell and Barnsdall's Realty 1-B, completed Feb. 20, 1937. **Structure:** Deep seated dome, faulted. **Producing Formation:** Miocene 8594-10,300 ft, 9 pays averaging 20 ft thickness. **Production in 1949:** 739,963 bbls; through 1949: 15,904,963 bbls; daily, March 1, 1950: 1746 bbls. **Producing Wells, March 1, 1950:** 27 with no rigs running. **Gravity:** 37-45.6°. **Deepest Test:** 11,440 ft in Miocene. **Oil Outlet:** Shell 4-in to Black Bayou, then barge. **Principal Leaseholders:** Shell & Barnsdall, Union Prod Co.

GIBSON, EAST (Distillate)

10 mi w of Houma, Sect. 25-17s-15e. **Discovery Data:** Structure by reflection seismograph. Field by Falcon Seaboard and William Helis' Jackson Unit 1, completed Nov. 4, 1943. **Structure:** Deep seated, faulted dome. **Producing Formations:** Miocene 5878-5920, 8432-58, 9280-97 ft. **Production in 1949:** 16,085 bbls; through 1949: 87,100 bbls; daily, March 1, 1950: 33 bbls. **Producing Wells, March 1, 1950:** 3 with no rigs running. **Gravity:** 48-51.5°. **Deepest Test:** 10,600 ft in Miocene. **Oil Outlet:** Barge to Shell refinery at Norco. **Principal Leaseholders:** Shell & Barnsdall, William Helis, Sun Oil.

GIBSON, NORTHEAST

12 mi nw of Houma, Sect. 14-17s-15e. **Discovery Data:** Structure by reflection seismograph. Field by Shell & Barnsdall's Realty Operators 7-B, completed Aug. 14, 1941. **Structure:** Deep seated salt dome. **Producing Formation:** Miocene 8480-9518 ft. **Production in 1949:** 936,527 bbls; through 1949: 8,563,527 bbls; daily, March 1, 1950: 2441 bbls. **Producing Wells, March 1, 1950:** 17 with no rigs running. **Gravity:** 37°. **Deepest Test:** Discovery well at 10,535 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Shell & Barnsdall.

HOUMA (Distillate)

Townships 16, 17s-17, 18e. **Discovery Data:** Field by Union Oil Co. of California's Gaidry 1, completed Dec. 25, 1944. **Structure:** Probable deep seated dome. **Producing Formations:** Miocene 10,290-318, 11,930-50 ft. **Production in 1949:** 48,256 bbls; through 1949: 122,230 bbls; daily, March 1, 1950: 193 bbls. **Producing Wells, March 1, 1950:** 7 with no rigs running. **Gravity:** 43.7-50.1°. **Deepest Test:** Discovery well at 12,618 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Union Oil Co. of California. **Remarks:** Includes Houma, North field.

HOUMA, SOUTH

Sect. 73-18s-18e. **Discovery Data:** Structure by reflection seismograph, Shell, 1936-37. Field by Shell's Peters 1, completed Nov. 13, 1938. **Structure:** Believed deep dome. **Producing Formation:** Miocene 9750-10,310 ft. **Production in 1949:** 47,143 bbls; through 1949: 933,538 bbls; daily, March 1, 1950: 130 bbls. **Producing Wells, March 1, 1950:** 2 with no rigs running. **Gravity:** 37-52°. **Deepest Test:** 11,570 ft in Miocene. **Oil Outlet:** Barge. **Principal Laeseholder:** Shell.

LAKE BARRE

Sect. 36, 37, 38, 39, 40-21s-19e; 30-21s-20e. **Discovery Data:** Structure by refraction seismograph, Louisiana Land & Exploration Co., 1928. Field by Texas Co.'s Lake Barre A-2, completed Sept., 1929. **Structure:** Piercement-type salt dome, cap rock 750 ft, salt 852 ft. **Producing Formations:** Miocene 3465-3512, 10,457-521, 11,772-078, 11,899-915 ft. **Production in 1949:** 120,683 bbls; through 1949: 18,993,521 bbls; daily, March 1, 1950: 239 bbls. **Producing Wells, March 1, 1950:** 19 with 1 rig running. **Gravity:** 30-54°. **Deepest Test:** 14,021 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co.

LAKE DECADE

7 mi sw Theriot, Sect. 27-19s-15e. **Discovery Data:** Structure by reflection seismograph. Field by Superior Oil Co.'s Laterre Land Co. 1, completed in 1942. **Structure:** Probable deep seated salt dome. **Producing Formations:** Miocene 10,187-10,232 ft. **Production in 1949:** 11,984 bbls; through 1949: 109,970 bbls; daily, March 1, 1950: 23 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 35°. **Deepest Test:** 13,678 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Superior Oil Co.

LAKE HATCH

7½ mi se of Gibson, Sect. 8-18s-16e. **Discovery Data:** Structure by reflection seismograph. Field by Union Oil Co. of Calif.'s State-LL&E 1, completed Aug. 19, 1948. **Structure:** Salt dome. **Producing Formation:** Miocene 7893-918 ft. **Production in 1949:** 61,388 bbls through 1949: 82,078 bbls; daily, March 1, 1950: 198 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 35.1°. **Deepest Test:** Discovery well at 11,203 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Union Oil of Calif.

LAKE PELTO

Township 23s-18e. **Discovery Data:** Structure by refraction seismograph, Louisiana Land & Exploration Co., 1928. Field by Texas Co.'s Lake Pelto B-1, completed July 1, 1929. **Structure:** Piercement-type salt dome, cap rock 2801 ft, salt 2859 ft. **Producing Formations:** Miocene 5000 to 11,008 ft, 9 pays averaging 55 ft thickness, Pliocene 1324-78 ft, Miocene 5200-12,400 ft (10 pays). **Production in 1949:** 1,589,481 bbls; through 1949: 11,450,645 bbls; daily, March 1, 1950: 4724 bbls. **Producing Wells, March 1, 1950:** 32 with 2 rigs running. **Gravity:** 34-43°. **Deepest Test:** Texas Co.'s State-Lake Pelto Lse. 1248-13-2, at 15,543 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Texas Co.

LAPEYROUSE (Distillate)

Immediately w of Bayou Caillou, Twp. 20s-18e. **Discovery Data:** Structure by reflection seismograph. Field by Gulf's M. E. Picou 1, completed Oct. 4, 1941. **Structure:** Deep seated dome. **Producing Formations:** Miocene 10,883-94, 12,640-64 ft. **Production in 1949:** None; through 1949: 3500 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 52°. **Deepest Test:** 13,879 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Gulf. **Remarks:** No production reported since 1948.

LIRETTE (Distillate)

8 of Houma. Gas development centered Sect. 5, 6, 7, 41-19s-19e. Oil development around Sect. 23, 31, 32, 35, 40, 41-19s-19e. **Discovery Data:** Structure by gas seepage and other surface indications. Adams Royalty Co. and Humble worked on the flanks with reflection seismograph and torsion balance in 1935. Field by Humble's Ellender 1, completed May 24, 1937. **Structure:** Deep dome. **Producing Formation:** Miocene 8370-12,020 ft, 5 sands averaging 50 ft thickness. **Production in 1949:** 265,566 bbls; through 1949: 1,946,562 bbls; daily, March 1, 1950: 576 bbls. **Producing Wells, March 1, 1950:** 13 with no rigs running. **Gravity:** 51°. **Deepest Test:** 12,168 ft in Miocene. **Oil Outlets:** Barge, United Gas 12-in (gas). **Principal Leaseholders:** Humble, Gulf, United Production Co.

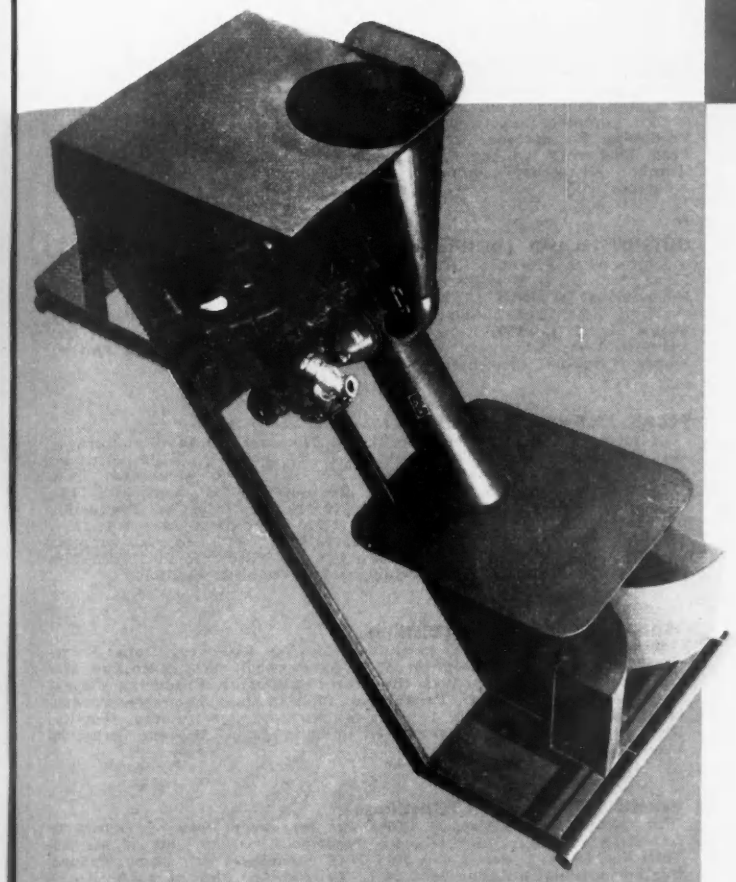
POINTE AU FER (Distillate)

Sect. 2-21s-11e. **Discovery Data:** Structure by reflection seismograph and torsion balance, Freeport Sulphur Co., 1930. Field by Barnsdall Oil Co.'s Nelson 3, completed Oct. 1, 1941. **Structure:** Fault. **Producing Formations:** Miocene 5604-30, 6750-60, 9862-66 ft. **Production in 1949:** 437 bbls; through 1949: 1414 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 48.9-57°. **Deepest Test:** 14,251 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Barnsdall, Texas Co.

SHIP SHOAL BLOCK 28 (Distillate)

7½ mi in Gulf of Mexico. **Discovery Data:** Structure by reflection seismograph. Field by Kerr-McGee Oil Industries' State Lse. 750-1, completed July 20, 1949. **Structure:** Piercement-type salt dome. **Producing Formation:** Miocene 8482-90 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 55°. **Deepest Test:** Discovery well at 13,975 ft in Miocene. **Principal Leaseholders:** Kerr-McGee, Stanolind, Phillips.

TIW



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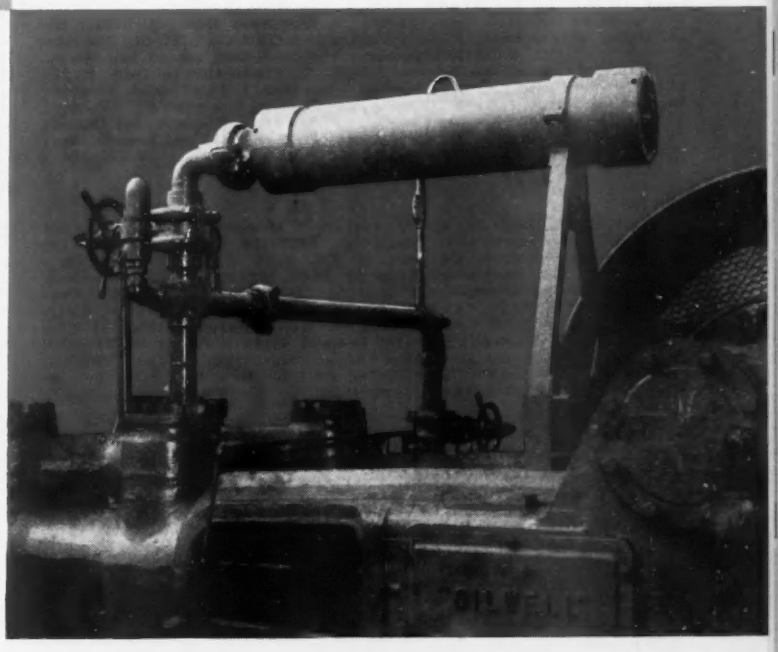

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SHIP SHOAL BLOCK 32
12 mi in Gulf of Mexico. **Discovery Data:** Structure by reflection seismograph. Field by Kerr-McGee Oil Industries' State Lse. 754-1, completed Dec. 31, 1947. **Structure:** Piercement-type salt dome. **Producing Formation:** Pleistocene 1655-3183 ft. **Production in 1949:** 119,588 bbls; through 1949: 183,352 bbls; daily, March 1, 1950: 406 bbls. **Producing Wells, March 1, 1950:** 5 with no rigs running. **Gravity:** 25°. **Deepest Test:** 3398 ft in Pleistocene. **Oil Outlet:** Barge. **Principal Leaseholders:** Kerr-McGee, Stanolind, Phillips.

SHIP SHOAL BLOCK 72 (Distillate)
8 mi in Gulf of Mexico. **Discovery Data:** Structure by reflection seismograph. Field by Magnolia Petroleum Co.'s Ship Shoal-State Lse. 766-1, completed Aug. 20, 1948. **Structure:** Salt dome. **Producing Formation:** Miocene 7266-7340 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** None with no rigs running. **Gravity:** 47°. **Deepest Test:** Discovery well at 9355 ft in Miocene. **Principal Leaseholder:** Magnolia.

SOUTH TIMBALIER
10 mi s of Timbalier Island, in Gulf of Mexico, Block 34. **Discovery Data:** Structure by reflection seismograph. Field by Humble O&R Co.'s So. Timbalier St. Lse. Acct. 1-1, completed March 29, 1949. **Structure:** Salt dome. **Producing Formation:** Miocene 9550-58 ft. **Production in 1949:** 69,430 bbls; through 1949: 69,430 bbls; daily, March 1, 1950: 123 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 39.6°. **Deepest Test:** Discovery well at 9926 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Humble.

TURTLE BAYOU (Castell) (Distillate)
Sect. 32-17s-14e. **Discovery Data:** Field by Shell Oil Co.'s Continental Land & Fur. Co. 1, completed Nov. 29, 1949. **Producing Formations:** Miocene 11,980-88 ft. **Production in 1949:** 102 bbls; through 1949, 102 bbls; daily, March 1, 1950: 69 bbls. **Producing Wells, March 1, 1950:** 1 with no rigs running. **Gravity:** 47.5°. **Deepest Test:** Discovery well at 12,002 ft in Miocene. **Principal Leaseholder:** Shell. **Remarks:** Originally called Castell field.

VERMILION PARISH

ABBEVILLE
Township 12s-3e. **Discovery Data:** Structure by reflection seismograph, Stanolind, 1935. Gulf and Continental worked area with reflection seismograph in 1934-35. Field by Continental's Herbert 1, completed March 14, 1937. **Structure:** Deep seated, faulted dome. **Producing Formations:** Miocene 6253-10,315 ft (6 pays). **Production in 1949:** 110,994 bbls; through 1949: 1,613,569 bbls; daily, March 1, 1950: 497 bbls. **Producing Wells, March 1, 1950:** 11 with no rigs running. **Gravity:** 50°. **Deepest Test:** 12,216 ft in Oligocene. **Oil Outlets:** Texas Co. 10-in and United Gas 8-in (gas) pipe lines. **Principal Leaseholders:** Continental, E. L. Buckley, M. Q. & A. Q. Peterson. **Remarks:** Discovery well was gas. Continental's Brookshire 1, completed Nov. 4, 1937, as first oil well.

EAST FLORENCE (Warren)
8 mi se of Gueydan. Sect. 23-13s-1w. **Discovery Data:** Structure by reflection seismograph. Field by Stanolind O&G Co.'s E. M. Watkins 1, completed Oct. 8, 1947. **Structure:** Probable deep seated salt dome. **Producing Formations:** Miocene 7070-73 ft. **Production in 1949:** 27,219 bbls; through 1949: 61,846 bbls; daily, March 1, 1950: none. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 56°. **Deepest Test:** Discovery well at 12,191 ft in Miocene. **Oil Outlet:** Barge to Cities Service Refinery, Lake Charles. **Principal Leaseholder:** Stanolind.

ERATH
sw of Erath, Sect. 16, 21, 22, 41-13s-4e. **Discovery Data:** Structure by reflection seismograph, Texas Co., Drunella Oil Co., Tide Water 1936. Torsion balance, De Soto Oil Co., 1938. Field by Texas Co.'s School Board 1, completed April 22, 1940. **Structure:** Probable deep dome. **Producing Formations:** Miocene 7349-11,600 ft (9 pays). **Production in 1949:** *4,452,183 bbls; through 1949: *34,821,599 bbls; daily, March 1, *1950: 10,400 bbls. **Producing Wells, March 1, 1950:** 31 with no rigs running. **Gravity:** 32-51°. **Deepest Test:** 12,035 ft in Miocene. **Oil Outlets:** Texas Co. 10-in pipe line to Port Arthur; barge. **Principal Leaseholders:** Texas Co., Tide Water, Phillips. **Remarks:** *Includes recycling plant distillate, which amounted to 7,163 bbls daily on March 1, 1950.

FRESH WATER BAYOU (Distillate)
11 mi se of White Lake, East field, Sect. 33-16s-2e. **Discovery Data:** Structure by reflection seismograph. Field by Union Oil Co. of Calif.'s Louisiana Furs, 1-C, completed Nov. 30, 1942. **Structure:** Deep seated dome. **Producing Formations:** Miocene 11,200-587 ft. **Production in 1949:** none; through 1949: 12,000 bbls; daily, March 1, 1950: none. **Producing Wells:** 0 with no rigs running. **Gravity:** 53.8°. **Deepest Test:** 12,400 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Union of California. **Remarks:** Last reported distillate production wa sin 1947.

GUEYDAN
Sect. 27, 28, 34-11s-1w. **Discovery Data:** Structure by refraction seismograph, Pure 1929. Field by Pure's Alliance 2, completed April, 1932. **Structure:** Piercement-type salt dome, anhydrite 4772 ft, salt 5800 ft. **Producing Formations:** Miocene 4060-10,800 ft (10 pays). **Production in 1949:** 1,700,948 bbls; through 1949: 14,511,017 bbls; daily, March 1, 1950: 4948 bbls. **Producing Wells, March 1, 1950:** 29 with no rigs running. **Gravity:** 30-60°. **Deepest Test:** 11,163 ft in Miocene. **Oil Outlets:** Pure 8-in to Intercoastal Canal; barge. **Principal Leaseholders:** Pure, Texas Gulf Prod.

GUEYDAN, WEST
W of Gueydan field, Sect. 5, 8-12s-2w. **Discovery Data:** Structure by reflection seismograph, Magnolia, 1935, Salt Dome Oil Corp., Texas Co. and Pure worked in the area with torsion balance. Field by Magnolia's Ferguson 1, completed July 1, 1938. **Structure:** Dome. **Producing Formatoins:** Miocene 6685-10,814 ft, 9 sands averaging 20 ft thickness. **Production in 1949:** 415,165 bbls; through 1949: 4,271,885 bbls; daily, March 1, 1950: 1,009 bbls. **Producing Wells, March 1, 1950:** 19 with no rigs running. **Gravity:** 37-62°. **Deepest Test:** 12,208 ft in Miocene. **Oil Outlets:** Magnolia pipe line to Lake Arthur barge term. Pure pipe line to Mermentau barge term. **Principal Leaseholders:** Magnolia, Pure.

KAPLAN (Abandoned)
2 mi sw of Kaplan. Sect. 25-12s-1e. **Discovery Data:** Structure by reflection seismograph. Field by Humble O&R Co.'s A. R. Romaine et al 1, completed January 19, 1947. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 11,060-80 ft. **Gravity:** 31.2°. **Deepest Test:** Discovery well at 12,482 ft in Miocene. **Principal Leaseholder:** Humble. **Remarks:** Abandoned soon after discovery. No production reported.

OUTSIDE ISLAND (Distillate)
3 mi s of E. Florence (Warren) field. Sect. 6-14s-1e. Field by Hassie Hunt Tr.'s J. S. Broussard 1, completed March 22, 1949. **Producing Formations:** Miocene 12,098-106 ft. **Production in 1949:** 23,842 bbls; through 1949, 23,842 bbls; daily, March 1, 1950: None. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 43°. **Deepest Test:** Discovery well at 12,636 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Hassie Hunt Trust.

PECAN ISLAND (Distillate)
28 mi s of Kaplan. Township 16s-1e. **Discovery Data:** Structure by Humble's reflection seismograph. Field by Humble Oil & Refining Co.'s Louisiana Furs 1, completed Feb. 23, 1943. **Structure:** Deep seated, faulted dome. **Producing Formations:** Miocene 7498-7534, 10,264-304, 10,800-852, 10,940-60, 11,170-220, 11,240-55 ft. **Production in 1949:** 41,301 bbls; through 1949: 186,926 bbls; daily, March 1, 1950: 192 bbls. **Producing Wells, March 1, 1950:** 12 with no rigs running. **Gravity:** 37-50°. **Deepest Test:** Humble's La. Furs 1-B, at 12,677 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Humble.

VERMILION BLOCK 39 (Distillate)
State Lse. 880, Block 39 in Gulf of Mexico. **Discovery Data:** Structure by reflection seismograph. Field by Pure Oil Co.'s State Lse. 880-1-B, completed June 10, 1949. **Structure:** Salt dome. **Producing Formations:** Miocene 8328-32 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** Dist. **Deepest Test:** Discovery well at 10,279 ft in Miocene. **Principal Leaseholder:** Pure.

VERMILION BLOCK 71 (Distillate)
19 mi in Gulf of Mexico, Block 71. **Discovery Data:** Structure by reflection seismograph. Field by Superior Oil Co.'s Gulf of Mexico-State Lse 884-1-A, completed July 1948. **Structure:** Salt dome. **Producing Formations:** Miocene 9608-18 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 51.4°. **Deepest Test:** Discovery well at 13,628 ft in Miocene. **Principal Leaseholder:** Superior.

VERMILION BLOCK 76 (Distillate)
19½ mi in Gulf of Mexico, Block 76. **Discovery Data:** Structure by reflection seismograph. Field by Superior Oil Co.'s Gulf of Mexico-State 1-C, completed May 1, 1949. **Structure:** Salt dome. **Producing Formations:** Miocene 7415-30 ft. **Production:** Shut in since discovery. **Producing Wells, March 1, 1950:** 1 (shut in) with no rigs running. **Gravity:** 46.5°. **Deepest Test:** Discovery well at 11,603 ft in Miocene. **Principal Leaseholder:** Superior.

WHITE LAKE, EAST
Sect. 15, 16-15s-1e. **Discovery Data:** Structure by refraction seismograph. Field by Union Oil of California's Webster White Heirs 1, completed July, 1940. **Structure:** Deep seated dome. **Producing Formations:** Miocene 5952-10,530 ft (9 pays). **Production in 1949:** 1,217,441 bbls; through 1949: 8,467,906 bbls; daily, March 1, 1950: 3476 bbls. **Producing Wells, March 1, 1950:** 24 with no rigs running. **Gravity:** 34-40°. **Deepest Test:** Union of Calif.'s Vermilion Parish School Bd 4-B, at 11,475 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Union Oil of California. **Remarks:** First well drilled by Shell in 1933 and abandoned. For next six years, area tied up by litigation and carried to Supreme Court in 1939 for settlement.

WHITE LAKE, WEST
20 mi sw of Kaplan. Township 14s-2w. **Discovery Data:** Structure by reflection seismograph. Field by Union Oil of Calif.'s State Lse. 540-1-A, completed Dec. 31, 1943. **Structure:** Deep seated salt dome. **Producing Formations:** Miocene 7323-11,820 ft. **Production in 1949:** 105,-594 bbls; through 1949: 507,144 bbls; daily, March 1, 1950: 232 bbls. **Producing Wells, March 1, 1950:** 3 with 1 rig running. **Gravity:** 33-48°. **Deepest Test:** Discovery well at 12,001 ft in Miocene. **Oil Outlet:** Barge. **Principal Leaseholder:** Union Oil of California.

WEST BATON ROUGE PARISH

PORT ALLEN
Sect. 25, 26-7s-11e, 7 mi w of Port Allen. **Discovery Data:** Structure by reflection seismograph. Field by Amerada's Wilberts 1, completed April 7, 1941. **Structure:** Faulted anticline. **Producing Formations:** Aligocene 9604-30 ft. **Production in 1949:** 47,467 bbls; through 1949: 910,336 bbls; daily, March 1, 1950: 134 bbls. **Producing Wells, March 1, 1950:** 4 with no rigs running. **Gravity:** 37°. **Deepest Test:** Discovery well at 10,044 ft in Oligocene. **Oil Outlet:** Interstate Standard 4-in pipe line to Baton Rouge. **Principal Leaseholder:** Amerada.

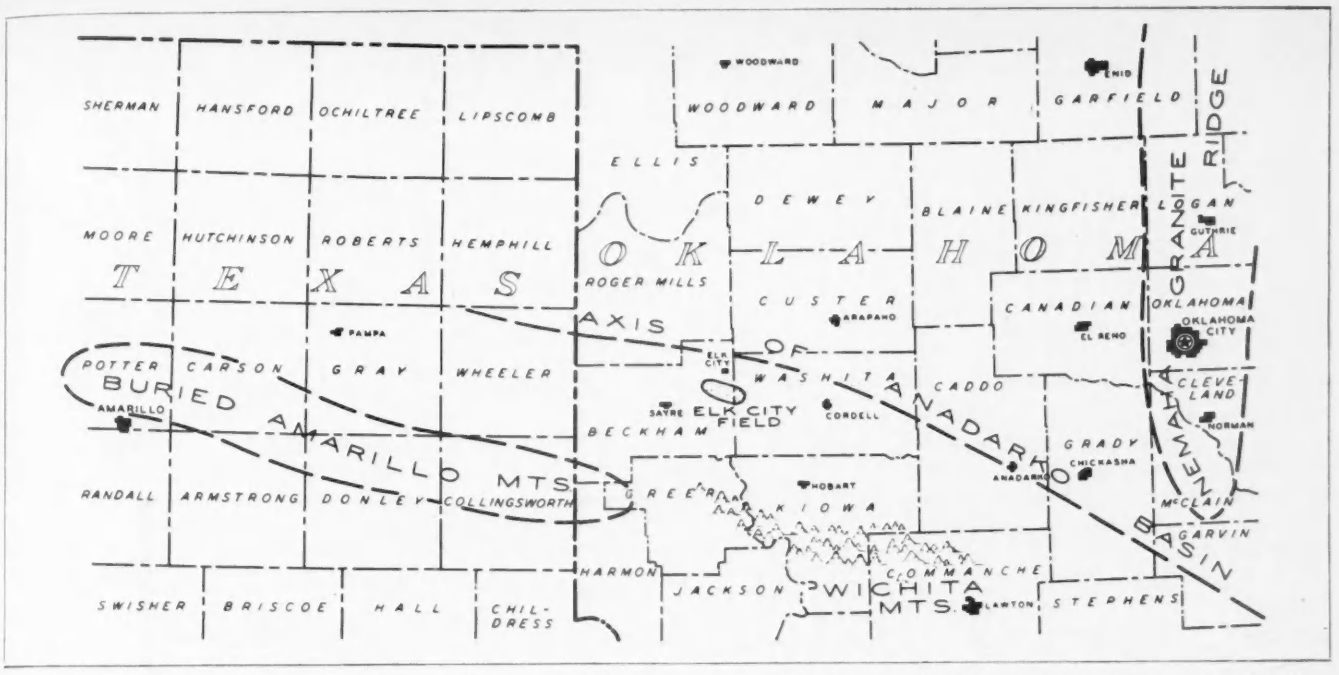


FIGURE 1. Map showing location of the Elk City field in relation to the major geological features of Western Oklahoma and the Texas Panhandle.

The Elk City Pool

By DR. W. L. WILGUS

Geologist, Shell Oil Company, Tulsa

ELK CITY FIELD, western Oklahoma, has demonstrated the importance of oil and gas possibilities in the Anadarko Basin. It covers 6000 acres and still is undefined, having 41 productive wells on 40-acre spacing pattern, yielding 8500 barrels of oil and condensate per day, with allowables of 215 barrels daily per well. Discovered by reflection shooting, following gravity exploration, the structure is an elongated, narrow anticlinal fold, about eight miles long. Production is from granite wash and limestone in the lower section of the Missouri (Hoxbar) formation, of Pennsylvanian age, at depths of 8800 to 10,300 feet.

SHELL Oil Company's strike at Elk City, Okla., is considered indicative of the potential oil and gas possibilities of the Anadarko Basin of western Oklahoma, which has attracted ever-increasing attention during recent years.

The Elk City pool, still undefined but with about 6000 acres proven, is in eastern Beckham and western Washita counties, 10n-20-21w, about five miles south of the town of Elk City (Figure 1).

Its discovery was the culmination of approximately 20 years of study and analysis. Shell's work in locating the pool began in 1942-43, when gravity crews explored a wide expanse of the Anadarko Basin along the northern slope of the Wichita Mountains, after which the company acquired leases on about 38,000 acres.

Shell's discovery, J. G. Walters 1, NE¼ SW¼ 14-10n-21w was commenced September, 1946, and was completed a year and two months later, in November, 1947, at an estimated cost of $750,000. The well was drilled to 13,133 feet, plugged back, and completed through perforations at 9260-360 feet, with an initial potential of 470 barrels of 65.4-gravity API condensate, 25 barrels of fresh water, and 5541 Mcf gas per day through one-half inch choke. The second well, Long 1, was completed in February, 1949, through perforations at 9040-80 feet, making initially 2345 barrels of 54 gravity API oil and 3661 Mcf gas per day through a one inch choke.

Completion of the Long 1 started an active drilling campaign, and 46 wells have been drilled and 24 are now drilling. Out of the total drilled, 41 were producers and five were dry holes. The

field is being developed on a 40-acre spacing.

Shell is the principal operator in the field, having about 80 percent working interest in the proven acreage. Other companies operating in the field include United Carbon Company, E. Constantine, Wilcox Oil Company, Union Oil Company, Tide Water Associated Oil Company, The Superior Oil Company, Max Pray, Continental Oil Company, and J. M. Huber Corporation.

Geology of Basin

The structure was discovered by reflection shooting on the south flank of the Anadarko Basin. It is an elongated, narrow anticlinal fold, about eight miles long, trending in a northwesterly direction parallel to the axis of the basin, and having a structural closure of about 400 feet.

The geologic formations at El City are of Permian and Pennsylvanian age. The Permian outcrops at the surface and extends to a depth of about 6500 feet. The upper 3500 feet are composed almost entirely of red sands, shales and sandy shales, (red beds) except for a 250-foot zone of anhydrite interbedded with thin layers of salt and dolomite. This is the Blaine formation and occurs at about 1300 feet. The lower 3000 feet of Permian includes the Wellington and Pontotoc formations. The former is composed of green shale interbedded with thin layers of anhydrite and dolomite, both of which increase with depth to where they predominate in the lower part of the formation.

The Pontotoc includes about 1500-1700 feet of granite wash, interbedded with thin stringers of shaly lime. The granite wash matrix contains a very high percentage of brown shale and sandy shale and minor amounts of quartz and feldspar.

Pennsylvanian Age

The Pennsylvanian system has been penetrated to 14,582 feet in Continental-Pray Proctor 1, located in the center of NW/4 28-10n-20w. The Virgil, Missouri (Hoxbar) and Des Moines (Deese) formations are all present. The upper part of the Virgil is lithologically similar to the overlying Pontotoc granite wash, except that the limestone beds are more frequent and better developed. In the lower part, granite wash predominates but differs from the above in that the matrix is almost entirely quartz and feldspar with very minor amounts of shale.

The Missouri lies unconformably beneath the Virgil and is approximately 2400 feet thick. The Kansas City limestone member of the Missouri occurs in the Elk City section through an interval of at least 600 feet, being interbedded with granite wash. Near the middle of the Kansas City limestone is the Belle City member, which is persistent throughout the field. An electric log marker near the base of the Belle City is readily identified and is used as a datum for contouring the structure. The Belle City limestone occurs about 800 feet below the top of the Missouri, and for convenience, is used to divide the Missouri into an upper and lower section, the latter of which constitutes the producing section of Elk City. Lithogically, the Missouri is predominantly granite wash interbedded with lenses of limestone and sandy limestone of variable thickness (Figure 2).

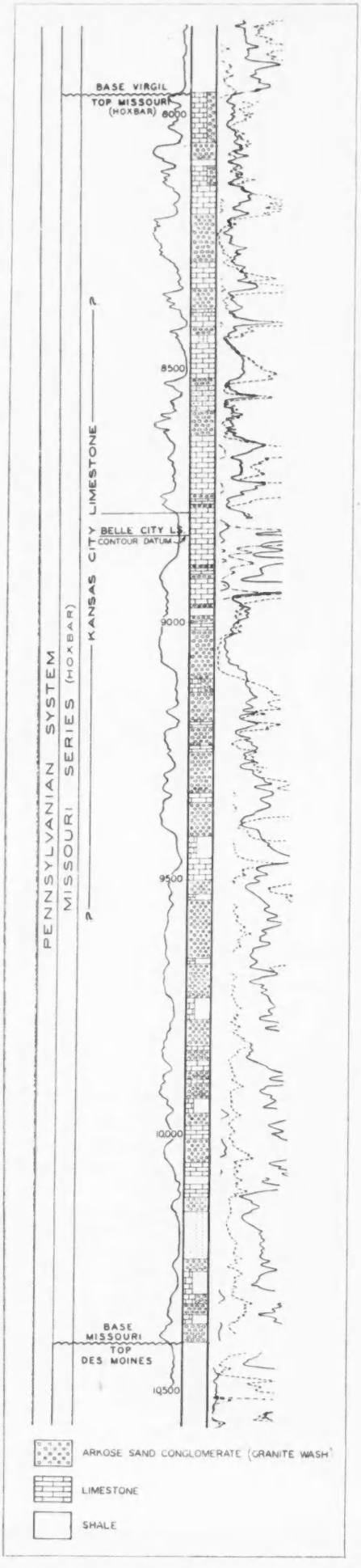
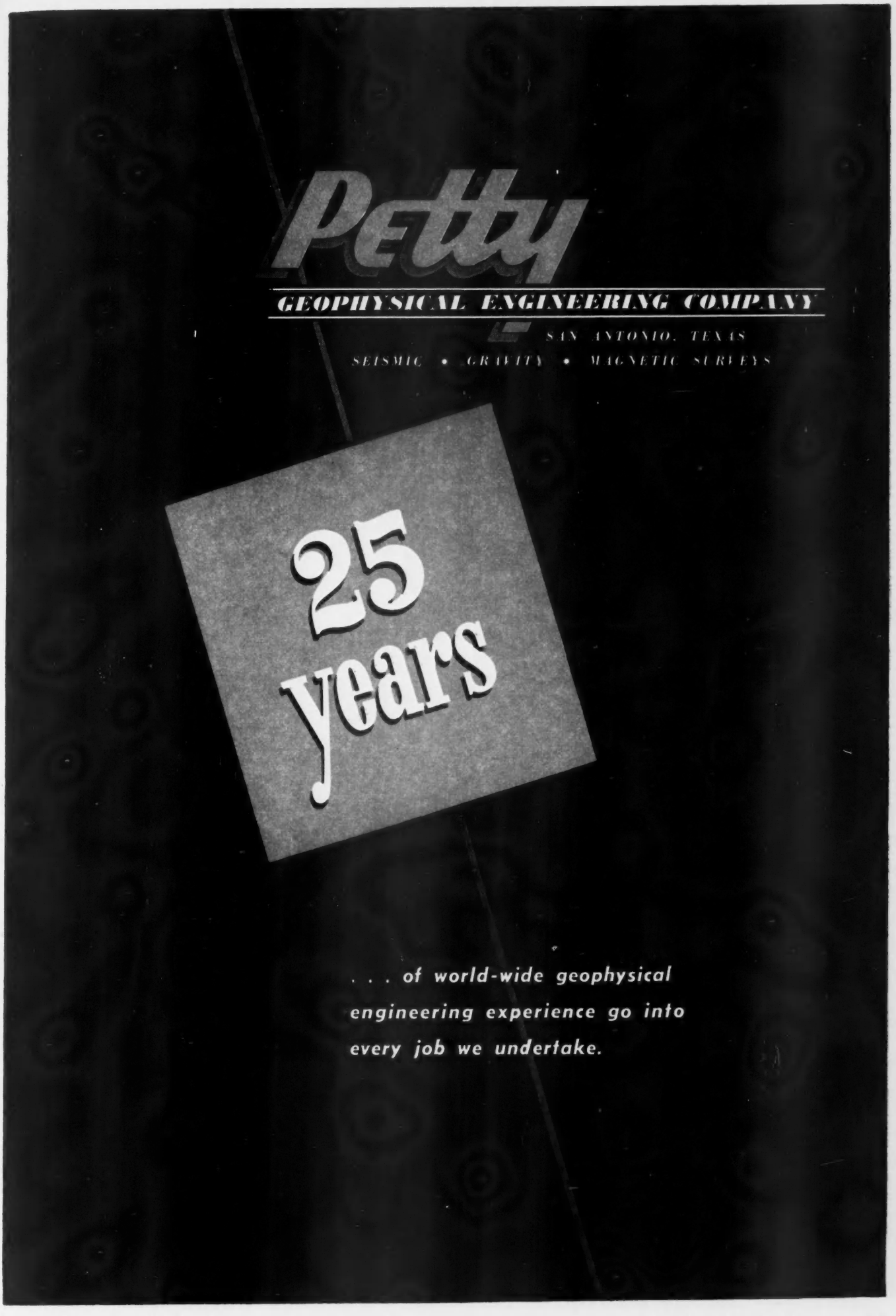


FIGURE 2. Composite log of Missouri section, Elk City field.

The term granite wash has been used very broadly to include a large variety of clastics derived from the rapid weathering of granites and other igneous rocks. More specifically, the clastics encountered in the Pennsylvanian formations at Elk City, especially the Missouri and Des Moines, should be described as an arkose sand conglomerate, consisting of a poorly sorted matrix of sub-rounded to angular, medium to coarse quartz and feldspar fragments. Imbedded within this matrix are pebbles of quartz, graywacke and chert which vary in size from a few millimeters up to six inches in diameter. This conglomerate varies widely in its degree of cementation, and in some instances it is loosely consolidated and porous, and in others it is a well-cemented dense mass, with little or no permeability, having an appearance very similar to a piece of rough concrete. This is the reservoir rock at Elk City that comprises about 75 to 80 percent of the Missouri formation. The underlying Des Moines section is very similar, but more shaly.

Origin of Rocks

A brief explanation of the origin of the reservoir rock will help to visualize its characteristics. During the early part of the Pennsylvanian period the Amarillo Wichita mountain system was uplifted, folded and faulted, and the area to the north was downwarped to form the Anadarko Basin, in which the Pennsylvanian and later the Permian sediments were deposited (Figure 1). The Penn-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sylvanian seas invaded the basin area, leaving the mountains rising above sea level. The mountains were chiefly granite, flanked with steeply dipping early Pennsylvanian and pre-Pennsylvanian sedimentary and metamorphic rocks, which were the source of most of the material deposited during later Pennsylvanian time. The mountains were high and the streams short and swift, and as the source of supply was close to the basin of deposition, the resulting sediments were predominantly coarse, arkose sand conglomerates, interbedded with marine limestones and sandy shales. Rapid deposition was conducive to lensing, numerous facies changes, and wide variations in permeability and porosity, all of which prevail throughout, and are typical of, the Virgil, Missouri and Des Moines formations at Elk City.

The migration and accumulation of oil in such a reservoir has produced many apparent anomalies not typical of homogeneous reservoirs. Yet, after careful study and correlation of all the data the apparent anomalies resolve themselves into normal conditions to be expected in this type of reservoir.

Oil, gas, and condensate have accumulated in commercial quantities in the Missouri formation below the Belle City limestone over a 1500-foot interval between the depths of 8800 and 10,300 feet. However, regardless of the thickness of this section, there is seldom more than a total of 10 percent sufficiently permeable to be productive. The average net thickness of the porous section is 75 feet.

Drilling Operations

The time required for drilling and completing an average well is about 90 days.

The mud requirements for drilling do not present unusual problems. Down to a depth of 7500 feet a salt water clay mud is used, and chemical treatment of the mud to this depth is not particularly practicable because of contamination from salt and anhydrite formations. At 7500 feet the contaminated mud is replaced with a bentonite clay mud which is chemically treated, using quebracho, caustic soda, soda ash and barium carbonate until the mud has the following properties:

Funnel viscosity:.....55 to 60 sec. API
Weight:.....9.2 to 9.6 lb. per gallon
Water loss:....ten cc. or less in 30 min.
Gel strength:...0 grams initial and 10-30 grams in ten minutes.

These mud properties are maintained to the total depth. Loss of circulation has occurred below 7000 feet but has been re-established without serious difficulty by using commercial lost circulation additives.

The casing program now in use includes 100 feet of 16-inch conductor pipe, a combination string of 600 feet of 9⅝-inch and 2400 feet of 8⅝-inch casing set through the anhydrite and salt section, and a 5½-inch production string. The production string is cemented through the lowermost productive interval penetrated, with cement sufficient to fill the annulus to at least 300 feet above the shallowest productive interval. A temperature survey is made, and if the cement job is indicated to be satisfactory, the well is completed by perforating the productive interval in which the lowest gas-oil ratio is anticipated at a satisfactory flow rate. Control on gas-oil ratios and flow rates is obtained from drill-stem tests during the drilling of the well and from production data of surrounding wells.

Field's Production

The current daily production from the Elk City field is 8500 barrels, oil and condensate, with a per well allowable of 215 barrels per day. Field rules recently granted by the Corporation Commission of Oklahoma took effect January 17, 1950. They provide that the Missouri (Hoxbar) producing formation shall be developed as one common source of supply by drilling one well to 40 acres, and that each well shall be permitted to produce with a gas-oil ratio of 5000 cubic feet per barrel without penalty.

The fluid complex is predominately gas and gas condensate with gravities up to 63-gravity API; however, high gravity crudes ranging from 43 to 55 gravity are produced. The crude at original reservoir conditions contains between 1200 and 2300 cubic feet of dissolved gas per barrel of stock tank oil, and with the average content of about 2000 cubic feet per barrel, exhibits a formation volume factor of 2.0. This means that two barrels of reservoir oil yield one barrel of stock tank oil and 2000 cubic feet of gas when produced. The reservoir gas contains between 90 and 175 barrels (per million cubic feet) of butanes plus heavier liquids. Wells producing gas condensate only yield from 60 to 200 barrels of stock tank liquids per million cubic feet, producing by three stage separation including tank storage.

The average well flows about 400 barrels stock tank liquid (and no water) per day through a 16/64-inch surface choke, against a back pressure of about 1500 pounds per square inch at the tubing head. With an average perforated net pay interval of about 50 feet, the productivity index is about 1.5 barrels of oil daily per pound drawdown of bottom hole pressure. The current average producing gas-oil ratio is about 4000 cubic feet per barrel, and the reservoir pressure averages about 3900 pounds.

Transportation

In its primary development stage and up to the beginning of the year, Elk City had produced about 800,000 barrels of oil. The production is being run through Shell's ten-inch line from Elk City to Cushing, Okla., a distance of 165 miles and built at a cost of approximately $4 million. A gas-gathering system has been constructed in the field which feeds into a 14-mile pipe line just north of the field. Gas in excess of drilling requirements is being sold to Consolidated Gas Company (which owns the 14-mile line), and at present 20 million cubic feet of gas per day are being delivered to the line.

Shell also plans a large-scale gasoline plant capable of processing 100 million cubic feet of gas per day and which is expected to cost about $6 million.

About the Author

W. L. WILGUS, area production geologist, Tulsa area, Shell Oil Company, started as a trainee for the company in engineering at Houston in 1934. He completed his training in 1935 and has since held various engineering assignments in Texas and Louisiana. He has held his present position since August, 1949. With the exception of one year spent at Washington University in St. Louis, Dr. Wilgus completed his education at the University of Wisconsin where he received his doctor's degree in geology in 1933.

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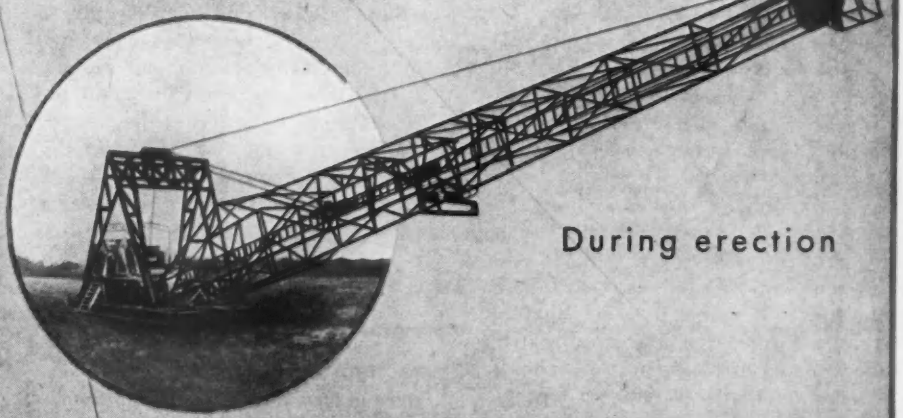

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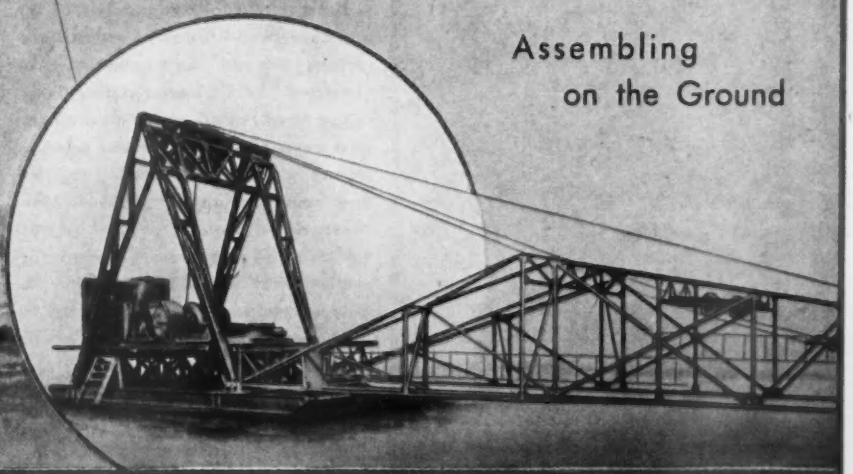

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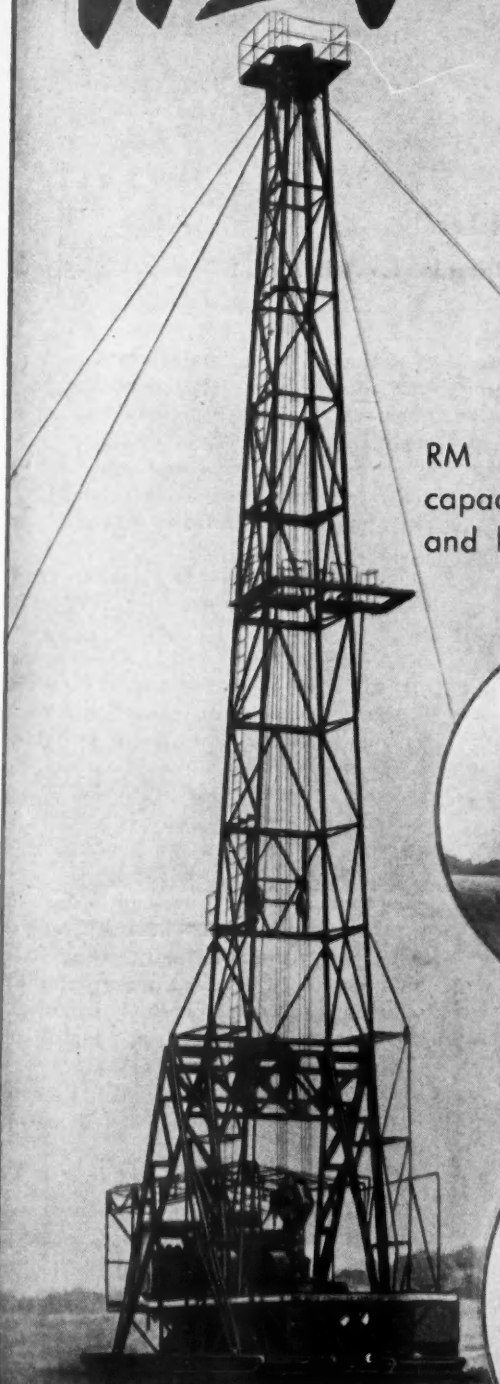

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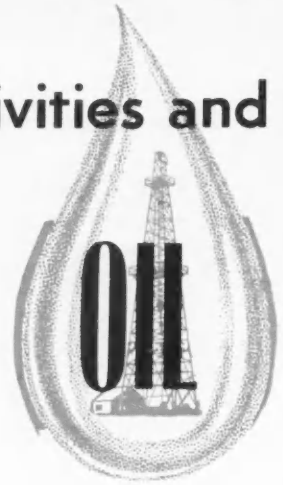
Bacterial Activities and the Origin of



By DR. CLAUDE E. ZOBELL

Scripps Institution of Oceanography, University of California, La Jolla, Calif.

INFORMATION on the origin of oil —how, when, where, and under what conditions crude oil is formed—may help the petroleum geologist in his quest for new deposits. Such information is the ultimate objective of API Research Project 43A, which has been concerned with investigating the possible part played by bacteria in the formation and modification of petroleum.[1,2,3]

In view of the strategic importance of oil in our mechanized and martialized civilization, it is anomalous that so little is known regarding how petroleum was formed. There are almost as many theories[4] to account for the origin of oil as there are students of the subject. No one theory seems to account for all of the facts, which suggests that oil may beformed in more than one way.[5] Most authorities[6,7,8,9] agree, however, that oil has been formed from organic matter, —the remains of plants and/or animals.

Assuming that oil had an organic origin, it is almost axiomatic that bacterial activity has contributed to the process, because virtually all types of organic compounds are susceptible to bacterial attack.

Versatility of Bacteria

Bacteria are simple single-celled microorganisms which multiply or reproduce with extreme rapidity. Under favorable conditions, bacteria may double in number every hour or two. They occur abundantly and widely distributed in soil, sediments, and nearly every place in nature where there is moisture, minerals, and organic matter.

Some bacteria, the so-called autotrophs,[10] thrive even in the absence of organic matter. As a source of energy autotrophs may oxidize such substances as molecular hydrogen, ferrous iron, manganous manganese, hydrogen sulfide, sulfur, thiosulfates, carbon monoxide, ammonium, or nitrite. Whether bacteria which obtain their energy from the oxidation of methane and higher hydrocarbons are autotrophs or not is a matter of definition, depending upon whether the hydrocarbons are regarded as organic or inorganic.

Bacteria which require free oxygen, the aerobes, predominate in abundance, but there are a good many bacterial species, the anaerobes, which live and are physiologically active in the absence of atmospheric oxygen.[10] The commonest anaerobes in marine sediments are sulfate-reducing bacteria.[11] They obtain their oxygen requirements from sulfates, which are reduced to sulfur or hydrogen sulfides:

$$SO_4 + 10\,H \rightarrow 4\,H_2O + H_2S$$

Bacteria produce a formidable array of enzymes[10] or biocatalysts which catalyze almost countless chemical reactions involving both organic and inorganic compounds. Their ability to multiply or reproduce and to produce active enzymes throughout a wide range of environmental conditions accounts for the versatility of bacteria.

There are bacteria which are biochemically active at temperatures as low as 25° F. and up to 200° F., probably higher. Some are active in the most dilute mineral salt solutions; others prefer brines saturated with salt. Some bacteria grow best at atmospheric pressure, while others thrive at hydrostatic pressures of several hundred atmospheres.[12]

From these characteristics it is apparent that bacteria could live and may be biochemically active in nearly any environment where petroleum occurs in nature irrespective of the temperature, salinity, or depth. Actually, living bacteria have been detected in petroliferous sediments and reservoir fluids from half a hundred fields and from depths of several thousand feet. Laboratory observations have demonstrated that these bacteria could be functional in such environments.[13]

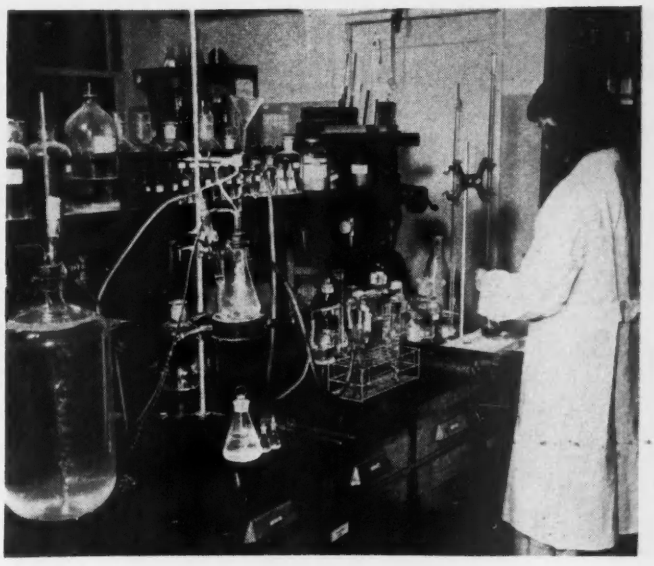
BACTERIA ARE responsible for the first steps in formation of petroleum from organic matter deposited in marine sediments. Extent and manner of the microbial modification of organic materials depend on environmental conditions. While bacteria play a part in the origin of oil, other mechanisms also must contribute to the process, including contact catalysts, pressure, and base exchange reactions. More research on the role played by bacteria can be expected to yield information that will be helpful to the petroleum industry in its search for new deposits. This paper is a contribution from API Research Project 43A, Scripps Institution of Oceanography, New Series No. 461. It is the summary of a lecture given before a joint meeting of the local sections of the American Institute of Chemical Engineers and the American Chemical Society in Tulsa, November 3, 1949.

Action on Organic Matter

The organic remains of plants and animals may be modified by bacterial activity in various ways, depending primarily upon the environmental conditions and the kinds of microorganisms present. In surface soil, as in well oxygenated water, the general tendency is for organic matter to be oxidized or mineralized, the end products being largely water, carbon dioxide, ammonia, sulfate, and phosphate. Under other environmental conditions bacteria tend to bring about the humification of organic matter, a process in which humus[14] and other complex organic residues result.

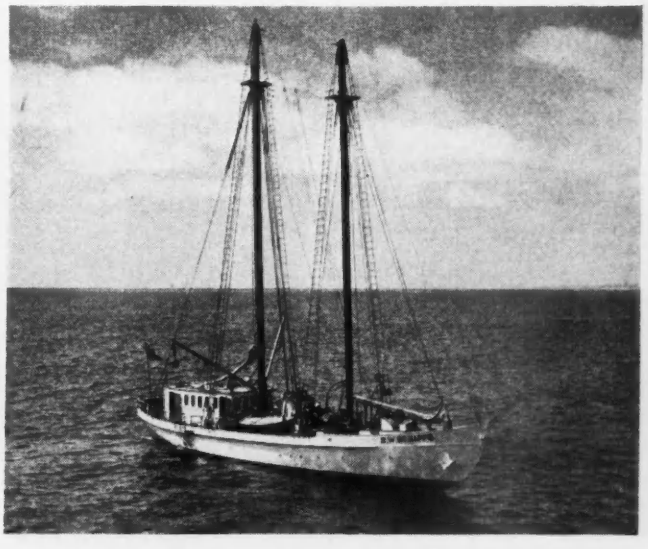
Under still other environmental con-

Bacteria culture bottles fitted with manometers for following gas production.



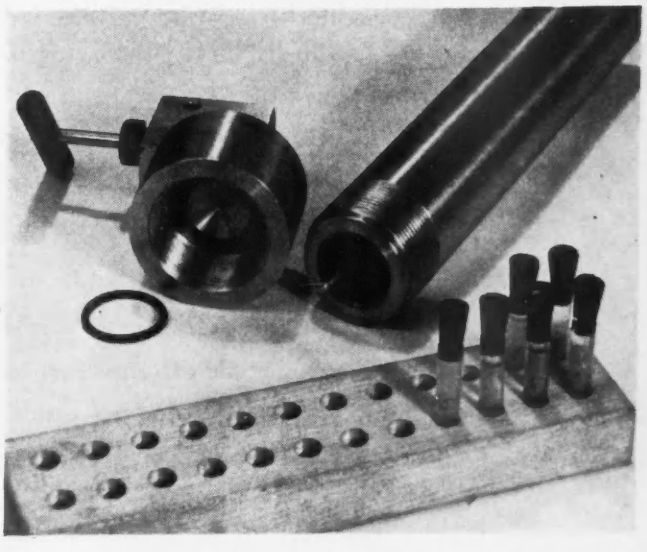
Laboratory apparatus for investigating "oil" producing bacteria.

The 1000-foot pier and principal buildings of the Scripps Institute.



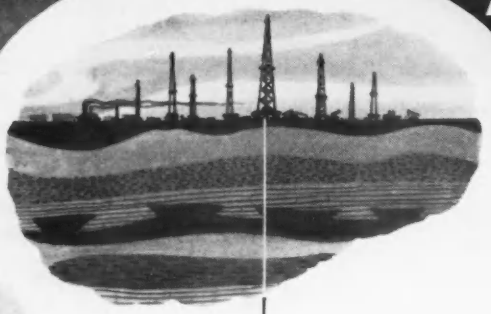
The 104-foot research vessel employed by the Scripps Institute for work at sea.

Meter and electrode assembly used for measuring the pH and redox potential of sediment samples.



The pressure cylinder sealed with an "O" ring gasket will accommodate 24 culture tubes at pressures up to 30,000 psi.

the thinking of world oil AUTHORITIES



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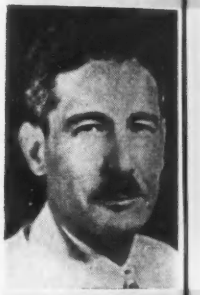

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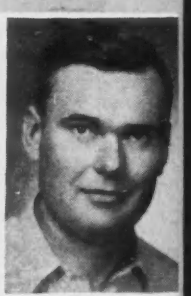

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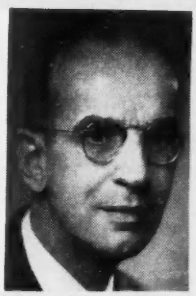

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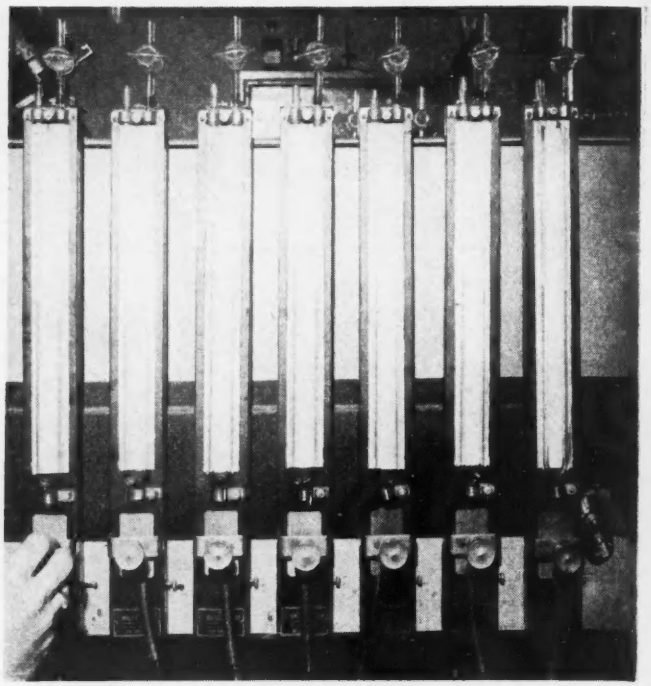
Supercentrifuge is used by Dr. W. D. Rosenfeld for separating bacterial cells from liquid in which they grow.



A battery of micro-respirometers employed for following the amounts of gases produced or consumed by bacteria.

ditions, bacteria and allied microorganisms, assisted by other agencies, catalyze the carbonization or coalification of organic matter, as in peat bogs[16] where there is a progressive decrease in the hydrogen, oxygen, nitrogen, sulfur, and phosphorous content of organic matter. A similar process, with one noteworthy exception, tends to convert organic matter into oil. In the latter process, which can be designated reduction or hydrogenation, there is also a decrease in the oxygen, nitrogen, sulfur, and phosphorous content of organic residues, but instead of the hydrogen to carbon (H/C) ratio decreasing, as in the coalification process, the tendency is for the H/C ratio to increase.

The reduction or hydrogenation of organic residues results in the formation of substances which are more petroleum-like in composition. This may be illustrated by the following data on the chemical composition of organic residues recovered from the sea floor and of crude oils from different fields:

Element	Organic Residues	Crude Oils
Carbon	45.4-56.0 percent	82.2-87.1 percent
Hydrogen	5.1- 8.9 percent	11.7-14.7 percent
Oxygen	24.3-33.6 percent	0.1- 4.9 percent
Nitrogen	9.7-15.7 percent	0.1- 1.5 percent

It will be observed that whereas they contain a higher percentage of hydrogen than most marine organic residues, crude oils contain considerably less oxygen and nitrogen.

When subjected to the action of anaerobic bacteria under highly reducing conditions in the laboratory, the organic remains of marine plants and animals are slowly decomposed with the liberation of carbon dioxide, ammonia, hydrogen sulfide, etc. Although the total carbon content may diminish during this process, the resulting residue is relatively richer in both carbon and hydrogen as it contains a decreasing percentage of oxygen, nitrogen, and sulfur.

A similar change in the chemical composition of the organic matter found in certain marine sediments of increasing antiquity (period or depth of burial) has been observed. Thus, laboratory as well as field observations indicate that under certain conditions, bacteria tend to convert organic matter into residues which are more petroleum-like in character. Fractions of the residues have been shown to consist of liquid and solid hydrocarbons which are indistinguishable from petroleum hydrocarbons.

Bacteria Produce Hydrocarbons

That methane, a common constituent of natural gas and crude oil, is produced by bacteria has been known for several decades. Methane is formed[16] during the anaerobic fermentation of organic matter and possibly by other bacterial processes under environmental conditions resembling those in which petroleum is found and in which petroleum is believed to have been formed. There is also evidence for the bacterial formation of minute traces of ethane, propane, and certain other gaseous hydrocarbons, but certainly not in the concentrations in which these hydrocarbons occur in natural gases associated with crude.

A good many bacterial species[10] produce carotene, leprotene, rhodopurpurin, flavorhodin, and other compled pigmented hydrocarbons having the empirical formula $C_{40}H_{54-58}$. Although such hydrocarbons are not constituents of petroleum, they illustrate the ability of bacteria to synthesize complex hydrocarbons.

Certain sulfate-reducing bacteria, isolated from marine sediments, produce small amounts of liquid and solid hydrocarbons while utilizing fatty acids. Such hydrocarbons are synthesized as part of the bacterial cell substance, probably in much the same way as the rubber tree or the guayule plant synthesizes hydrocarbons.

Although the yields are small, it is significant that bacteria do produce liquid and solid hydrocarbons resembling those found in crude oil. The best yields from fatty acids to date have been of the order of from 0.01 to 0.05 percent of the carbon appearing as liquid and solid hydrocarbons. Whether other types of bacteria or other experimental conditions may yield higher concentrations of petroleum hydrocarbons are unexplored possibilities.

During the decomposition of proteins, bacteria produce phenol and para-cresol,[17] two compounds which occur quite commonly in crude.

Transformation of Hydrogen

Since the conversion of organic matter into petroleum hydrocarbons is a process which involves hydrogenation reactions, it is noteworthy that some bacteria liberate hydrogen from organic compounds and others catalyze the utilization of hydrogen.[18] Three different physiological types of anaerobic bacteria,

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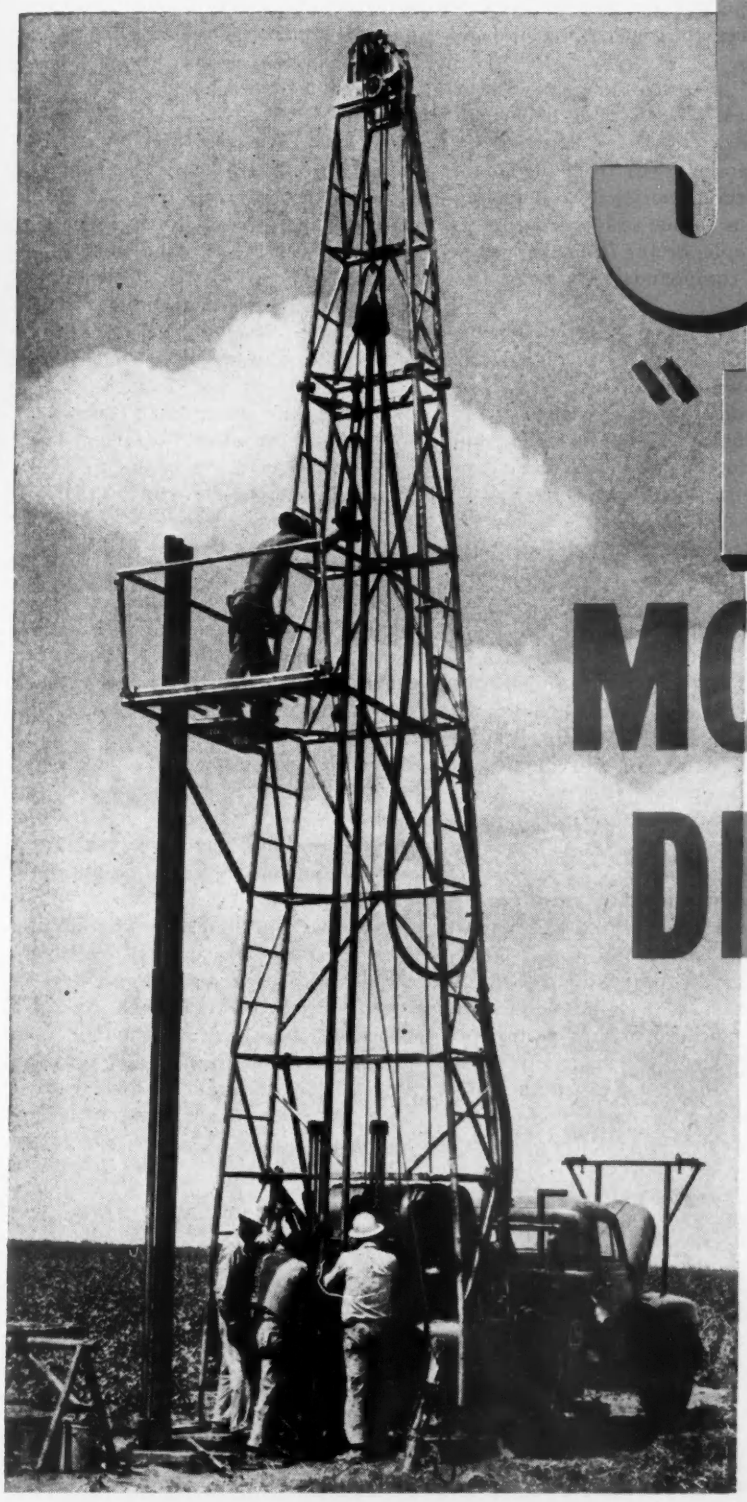

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which utilize hydrogen and thereby may be instrumental in the origin of oil, have been investigated.

One type catalyzes the combination of molecular hydrogen with organic compounds. Unsaturated compounds such as linolenic and linoleic acids and hexadecene, for example, are hydrogenated by these bacteria in accordance with the following reaction:

$$RCH = CHR + H_2 \rightarrow RCH_2CH_2R$$

where R is an alkyl group such as—CH_3, —C_2H_5, —C_3H_7, etc., or some other radical. Such bacteria also catalyze the reductive deamination of amino acids by molecular hydrogen:

$$RCHNH_2COOH + H_2 \rightarrow RCH_2 COOH + NH_3$$

Both processes, it will be observed, tend to convert certain kinds of organic compounds into products which are more petroleum-like. The direct decarboxylation of the compound, RCH_2COOH, would result in the formation of a hydrocarbon. Acetic acid is decarboxylated by certain bacteria with the liberation of methane:

$$CH_3COOH \rightarrow CO_2 + CH_4$$

Whether higher fatty acids are decarboxylated by bacteria with the formation of higher hydrocarbons is still problematical. Bacteria catalyze the decarboxylation of amino acids:

$$RCHNH_2COOH \rightarrow CO_2 + RCH_2NH_2$$

A second type of hydrogen-utilizing anaerobe catalyzes the reduction of carbon dioxide (or carbonates) with the formation of methane:

$$CO_2 + 4\,H_2 \rightarrow CH_4 + 2\,H_2O$$

A third type of hydrogen-utilizing anaerobe brings about the reduction of sulfates:

$$H_2SO_4 + 4\,H_2 \rightarrow H_2S + 4\,H_2O$$

By itself this reaction may not be of direct importance in the origin of oil except that it may help to account for the reduction of sulfates, a process which seems to have occurred rather commonly in brines associated with petroleum deposits. Of greater importance may be the multiplication or growth of bacteria which obtain their energy from the foregoing reaction. Upon chemical analysis the cell substance of these bacteria, which utilize hydrogen as the sole source of energy, is found to contain appreciable quantities of oily material.[19] The carbon comes from carbon dioxide or carbonates.

Hydrogen[18] for these reactions in source sediments of petroleum may come (a) from the bacterial fermentation or organic compounds, (b) from the interaction of certain inorganic compounds such as ferrous sulfide and hydrogen sulfide, for example, or (c) from the alpha-radiation of compounds containing hydrogen.

In view of the rather general presence in petroliferous sediments of radioactive constituents which tend to liberate hydrogen, hydrogen-utilizing bacteria[18] may assume significance as agents which help to account for the general paucity of free hydrogen in such environments.

Effect of Bacteria on Redox Potential

Bacteria growing in marine sediments devoid of free oxygen tend to create conditions which are more and more reducing in intensity. In other words, the tendency is for bacteria to lower the redox potential of sediments containing organic matter. The redox potential is the degree of oxidation or reduction of a reversible oxidation-reduction system, or it is a measure of how reducing or how oxidizing the system is with respect to some standard.

Marine sediments rich in organic matter and having a high bacterial population generally have a low redox potential.[20] It becomes lower with the age of the material or with core depth. The reducing conditions or low redox potentials of marine sediments are attributed to the activities of bacteria which consume oxygen, organic compounds, and other oxidizing substances. Once created, the reducing conditions are maintained by ferrous iron, manganous manganese, hydrogen sulfide, and certain reducing bacterial products.

Low redox potentials retard the oxidation of organic matter and promote hydrogenation reactions. By creating low redox potentials bacteria favor the formation as well as the preservation of petroleum hydrocarbons.

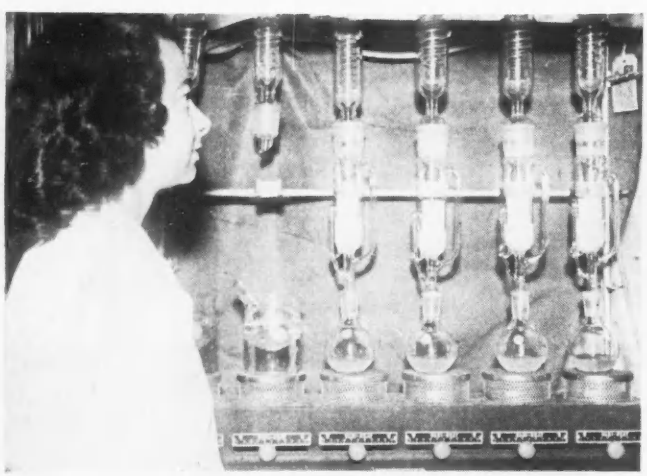
Liberation of Oil

There are several ways[21] in which bacteria may liberate oil from oil-bearing materials and promote its flow or accumulation in reservoirs. One of the most obvious ways is by the destruction of organic matrix containing oil. A second way is by dissolving sulfate or carbonate rocks to which oil is adsorbed. With the dissolution of such rocks or sediments, the adherent oil is free to flow and at the same time void spaces, pores, or channels may be formed or enlarged, thereby favoring the movement or accumulation of oil.

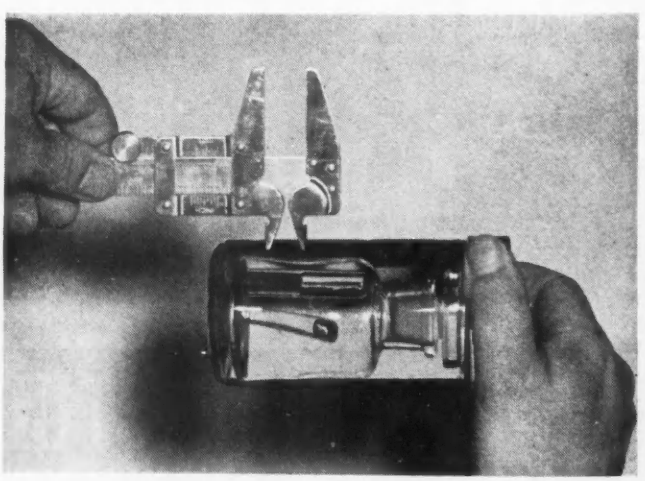
Third, carbon dioxide produced by bacteria tends to decrease the viscosity of oil and thereby promotes its movement. This may be said also of methane. Carbon dioxide, methane, hydrogen, and other gases produced by bacteria in micro-traps or capillary cavities may help to expel oil therefrom.

Fourth, certain bacteria which grow on solid surfaces crowd oil off from such surfaces. Especially effective are surface-dwelling bacteria which produce surface-tension depressants or detergents.

All four mechanisms whereby bacteria liberate oil from oil-bearing materials have been demonstrated by laboratory experiments.[21] Such bacterial processes may have contributed significantly to the migration and accumulation of oil throughout the geological ages. Whether it will prove to be prac-



Soxhlet extraction apparatus used for extracting ether-soluble substances from bacteria or their products.



Double water-jacketed apparatus for following hydrogen utilization by bacteria.

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tical to apply any or all of these bacterial processes to the secondary recovery of oil is a question which can be answered only by further investigations.

Microbial Modification of Oil

In the presence of mineral salts solutions virtually all kinds of petroleum hydrocarbons are attacked by bacteria or allied microorganisms.[32] This generalization is based upon work with more than a hundred pure hydrocarbons ranging in complexity from methane to dibenzanthracene as well as work with numerous mixtures of hydrocarbons. These mixtures include natural gases, ligroins, petroleum ethers, gasolines, benzines, distillates, fuel oils, lubricating oils, paraffin waxes, tars, asphalts, asphaltenes, coal tars, and samples of crude oil from many fields.

Bacteria, actinomyces, molds, and yeasts, which attack petroleum hydrocarbons, appear to be quite widely distributed in nature. They are especially abundant[32] in bottom waters over which petroleum products are stored, in oil-well brines, in cooling or cutting oils containing water, and in oil-soaked soil around swamps, oil pumps, refinery effluents, etc. Although most oil-oxidizing microorganisms require free oxygen, a few species utilize petroleum hydrocarbons in the absence of atmospheric oxygen. Anaerobic sulfate-reducing bacteria are in this latter category.

The activities of oil-oxidizing bacteria may account for the absence of oil from certain areas where it appears to have been present. Quite possibly oil accumulates only in environments where conditions are not conducive to the activities of such bacteria. This possibility suggests the desirability of learning much more regarding the factors which influence the activities of oil-oxidizing bacteria, because by so doing we may discover significant characteristics of source beds of petroleum which may prove to be useful in the search for new oil fields.

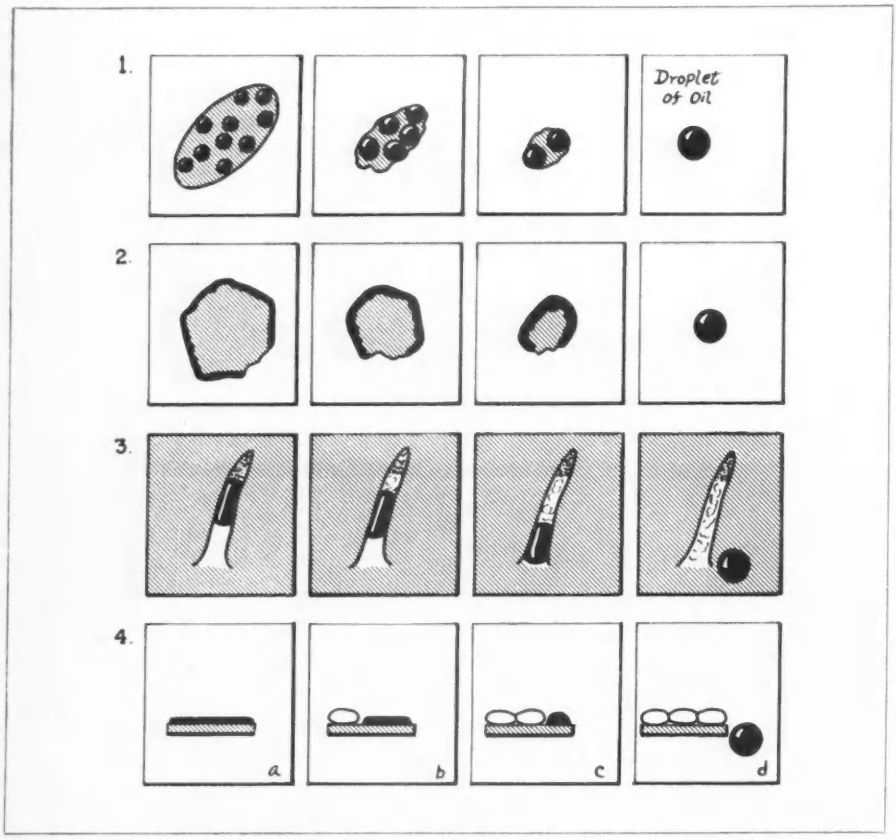
Investigations on the abundance or activities of methane-oxidizing bacteria in surface soil, as in so-called geomicrobiological prospecting procedures, may be one step in this direction.

The ability of oil-oxidizing bacteria to affect crude and petroleum products in laboratory experiments suggests that such bacteria may have played a part in the modification of petroleum or its constituents. Certain bacteria, for example, which selectively attack unsaturated compounds may help to account for the general lack of olefinic hydrocarbons in crude oils. The selective action of other types of bacteria on aliphatic or paraffinic hydrocarbons may help to explain why some deposits are predominantly naphthenic in character. On the other hand certain bacteria tend to attack preferentially naphthenic compounds and large molecules.

Both increases and decreases in the gravity of oil samples have been observed to be caused by bacterial action. The extent and direction of the change in the properties of crude oil caused by bacteria seems to be a function of the types of bacteria present, the environmental conditions, and the kinds of compounds present in the crude.

The sulfur, nitrogen, and oxygen content of petroleum may be largely due to bacterial activities in source sediments of petroleum. A decrease in the nitrogen and sulfur content of crude oil samples has been observed, but under other experimental conditions oil-oxidizing bacteria have caused increases in the sulfur and oxygen content of oils.

While there are several ways in which bacteria may modify crude oil in sediments, the facts are too fragmentary to warrant any conclusions or generalizations other than those suggested by preliminary observations.



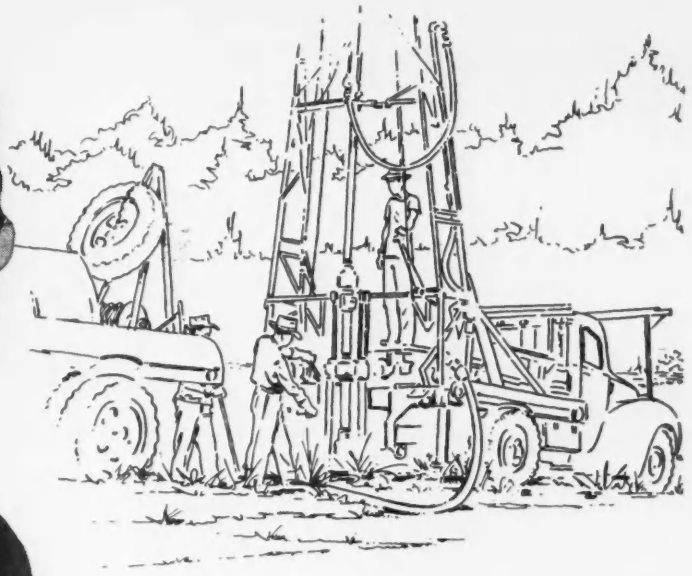
Diagrammatic representation of the principal ways in which bacteria release oil from oil-bearing materials and promote its accumulation, stages of action being depicted from left to right: 1. Micro-droplets of oil are liberated and coalesce as organic matrix is decomposed. 2. Gradual dissolution of carbonate (or sulfate) particle results in liberation and accumulation of adherent oil. 3. Gases produced in micro-trap expel oil. 4. A micro-film of oil on solid surface is displaced by bacteria which grow on such surfaces.

Summary and Conclusions

Bacteria and allied microorganisms are responsible for the first steps in the formation of petroleum from organic matter deposited in marine sediments. This conclusion is inescapable because the organic remains of all plants and animals are susceptible to attack by bacteria or their enzymes. The extent and manner of the microbial modification of organic materials depend primarily upon environmental conditions.

In sediments lacking free oxygen the general tendency is for anaerobic bacteria to convert organic matter into substances which are more and more petroleum-like in chemical composition by deaminations, decarboxylations, methylations, desulfurizations, and other processes. Methane as well as liquid and solid hydrocarbons are produced in small amounts by bacteria which utilize organic compounds. Petroleum hydrocarbons are also produced from carbon dioxide or carbonates by autotrophic bacteria which oxidize molecular hydrogen as the sole source of energy. The microbial utilization of molecular hydrogen may account for its general absence in natural gases from sediments.

Bacterial activities in sediments may favor the formation and preservation of petroleum hydrocarbons by lowering the redox potential. Bacteria may also contribute to the migration and accumula-



A. D. DUNLAP, Party Chief of crew 3, with 16 years of service to IX clients, got his first job on a seismograph crew before the ink on his Rice diploma was thoroughly dry. From September 1933, he worked his way up ... helper to shooter ... to observer ... computer, before his promotion to party chief. The average seismograph experience of an IX Party Chief is 15 years. His long continuous service with the Independent Exploration Co. organization, and natural aptitudes for exploration work typifies the skill and field work knowledge IX's clients find valuable.

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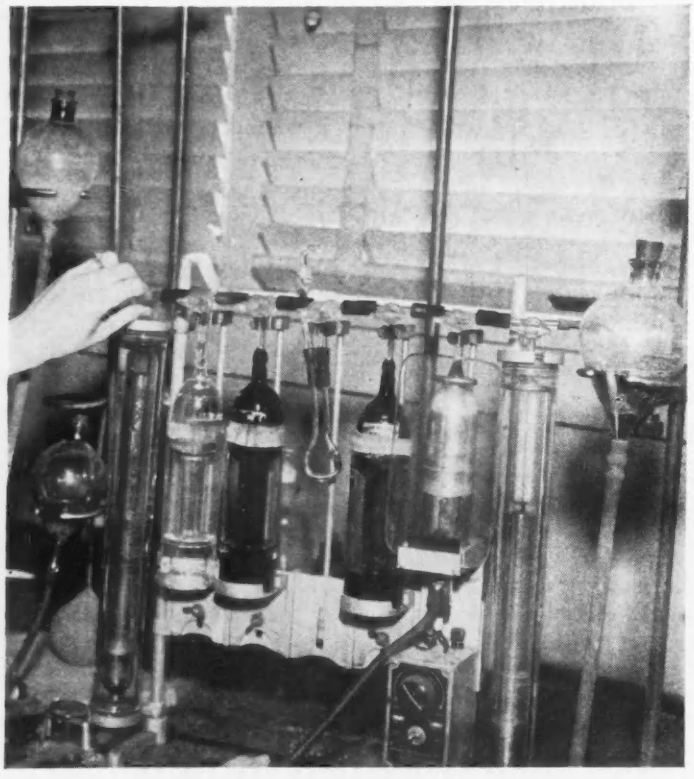
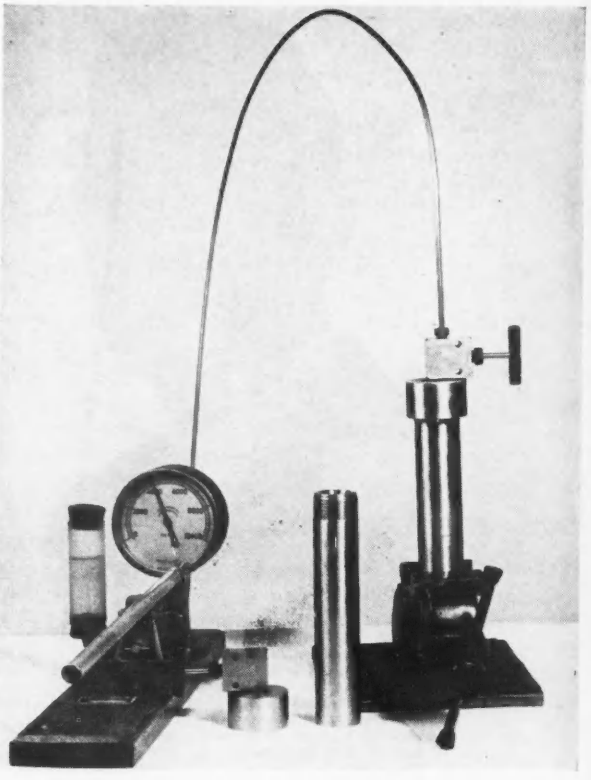


Modified Orsat gas analysis used for determining amounts of hydrogen, carbon dioxide, methane, and oxygen in gas mixtures modified by bacteria.



Hydraulic hand pump for applying pressures to bacterial cultures in steel cylinder up to 10,000 psi.

tion of oil by liberating oil from oil-bearing materials.

During and after its formation oil may be modified in various ways by bacteria which attack hydrocarbons and other constituents of petroleum.

While bacteria play a part in the origin of oil, there is no reason to postulate their mutual exclusiveness because contact catalysts, pressure, base exchange reactions, and other mechanisms must contribute to the process also. Much more research work will be required in order to appraise accurately the role played by bacteria. Such research can be expected to yield information that will prove to be useful to petroleum people in their search for new deposits.

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About the Author

DR. CLAUDE E. ZOBELL has conducted marine research work since 1932 at the Scripps Institute, where he is now professor of marine microbiology and director of API Research Project 43A. Besides his activities as a lecturer and consultant, he has published more than 130 technical articles, including a book on marine microbiology. During the last decade his attention has been focused primarily upon the applications of microbiology to the petroleum industry.

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Natural Gas and Natural Gas Liquid *Reserves in the U. S.*

By N. C. McGOWEN
President, United Gas Corporation

IN THE 130 or so years since natural gas was first piped and used in this country at Fredonia, N. Y., the gas industry has come a long way. Although large sums were spent during this period in construction and in expansion of markets, there was relatively little published information available as to the size of the underground reserves on which the industry was dependent. Until 1946, when the American Gas Association Committee on Natural Gas Reserves began the task of compiling annual estimates, there were no readily available figures prepared by competent experts and revised periodically.

The Committee on Natural Gas Reserves has approached this problem by enlisting the cooperation of operating companies and individuals in all the producing areas. The committee itself is made up of men chosen for their knowledge of the reserves of specific areas. The committee members organize subcommittees from among men in the industry who are familiar with the individual fields in the areas in which they live and work. Under this plan, the committee's estimates are really those of qualified experts with access to necessary information and with intimate knowledge of the fields in their localities. This plan has the additional advantage of allowing every company to retain possession of its own information. The figures are compiled in the subcommittees by men already familiar with the individual fields.

Our committee recently submitted its fifth annual report, summarizing proved recoverable reserves as of December 31, 1949. We estimate the natural gas reserves of the U. S. to be 180.4 trillion cubic feet. Production during 1949 was 6.2 trillion cubic feet, or only 3.4 percent of the reserves at the end of the year. However, during that year, the industry more than replaced its production. It added 4.6 trillion cubic feet through discoveries of new pools and 8.1 trillion through extensions to known pools and through other developments which necessitated revisions of old estimates. The net effect was an increase of 6.5 trillion cubic feet over the proved reserves of 173.9 trillion cubic feet at the beginning of the year.

This paper is from a talk presented before the spring meeting of the Natural Gas Division, American Gas Association, May 9 at Tulsa.

The year 1949 was not unique in this respect. In our first study we estimated the reserves of the U. S. as of December 31, 1945, to be 147.8 trillion cubic feet. Each succeeding study has found the proved reserves to be greater. While the oil and gas industry was producing 22.7 trillion cubic feet during the four years since our first estimate, it was finding 55.3 trillion cubic feet of new gas. The net effect was an increase of 32.6 trillion cubic feet in its reserves.

This four-year rise in reserves occurred during a period of unprecedented pipe line construction and expansion in natural gas markets, and has, of course, been encouraging. Certainly there is nothing in these figures to suggest that we have reached the end as far as finding new gas is concerned. In the last analysis, new reserves can be proved only by drilling and the rise in reserves which we have been reporting was a measure of the success of drilling in recent years.

Supply Concentrated

Approximately 82 percent of the nation's gas is in the six southwestern and southern states of New Mexico, Texas, Oklahoma, Arkansas, Louisiana and Mississippi, whose proved reserves are 147 trillion cubic feet. Most of our new gas continues to be found in this region. Of the 32.6 trillion cubic feet added to this country's reserves during the past four years, these six states accounted for 30.8 trillion feet. Texas alone, with 99.2 trillion cubic feet, holds 55 percent of the nation's gas, while Louisiana, with 26.7 trillion cubic feet and 15 percent of the total, is second among the states in proved reserves.

As part of its survey of the nation's natural gas resources the Committee on Gas Reserves incorporates in each of its reports a summary of the amount of gas in storage. Gas is now stored in pools in 13 states in such volumes that it must be taken into account when we add up our reserves. On December 31 of last year "stored" gas amounted to 288 billion cubic feet. This was an increase of 88 billion cubic feet over the previous year.

To summarize: after making five annual estimates the Committee on Natural Gas Reserves finds that the nation's proved reserves on December 31, 1949, stood at 180.4 trillion cubic feet. In spite of withdrawals of 22.7 trillion cubic feet during the past four years, reserves have increased by 32.6 trillion cubic feet.

I would like to stress one point in connection with the study of reserves. When we speak of "reserves" we mean **proved** reserves; that is, the reserves whose existence is known from wells already drilled. Potential reserves which remain to be discovered are not included. Obviously, then, one cannot divide these proved reserves by a year's production to get an idea of how many years our reserves will last. The number of years our reserves will last does not depend on our proved reserves alone. It depends as well on the gas which we will find in the future.

The history of the industry has been one of improvement and refinement in its methods of drilling and exploration. The ideas with which we appraise new prospects have also been subject to evolution and change. As the new techniques developed and as we gained new insight into the problems of evaluating prospective acreage, we have explored new areas and have re-examined the old ones. The rise in reserves which our studies reflect show that these efforts have been successful.

These improvements in drilling and exploration techniques are still taking place, and we still have large areas whose potentialities are still only partly explored. Using the past as a guide to the future, we may therefore reasonably expect to continue to find new reserves of gas for some time to come.

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Exploration

Declines in April

EXPLORATORY wells completed in April totaled 571 for a decline from the 620 finaled in March and 650 completed in April of last year. Despite the slight drop in activity, this year's wells totaled 2370 in the first four months to hold a 5.7 percent lead over last year's 2242 exploratory well completions.

April's exploration resulted in the discovery of 78 new oil pools, 67 new fields and 11 new pay strata in established fields. That was a decrease of 11 from March's oil discoveries. Six wells were successfully completed as distillate producers, five opening new fields and one locating a new horizon. The previous month's record had been seven distillate finds.

Exploration for gas did not fare quite so well as only four new gas pools, three fields and one pay were uncovered, while a month earlier, a total of 12 gas discoveries were made.

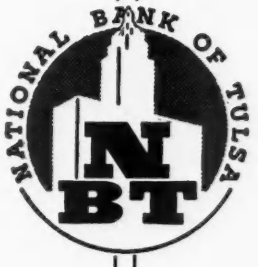
Summary of Results of Exploratory Drilling

ITEM	April, 1950	Mar., 1950	Four Months: Jan.-Mar. 1950	1949	Percent Diff.
Oil Discoveries	78	89	305	309	— 1.3
New Fields	67	59	223	213	+ 4.7
New Pays	11	30	82	96	— 14.6
Distillate Discoveries	6	7	27	48	— 43.8
New Fields	5	5	23	25	— 8.0
New Pays	1	2	4	23	— 82.6
Gas Discoveries	4	12	42	46	— 8.7
New Fields	3	11	37	37	.....
New Pays	1	1	5	9	— 44.4
Total Discoveries	88	108	374	403	— 7.2
Extensions to Fields	21	30	95	87	+ 9.2
Oil Fields	20	25	84	78	+ 7.7
Distillate Fields	.....	1	3	5	— 40.0
Gas Fields	1	4	8	4	+100.0
Total Prod. Tests	109	138	469	490	— 4.3
Dry Holes	462	482	1901	1752	+ 8.5
Wildcats	452	469	1815	1734	+ 4.7
New Pays	1	.....	5	2	+150.0
Outposts	9	13	81	16	+406.2
Total Expl'tory Tests	571	620	2370	2242	+ 5.7
Percent Productive	19.1	22.3	19.8	21.9	.....
Percent Dry	80.9	77.7	80.2	78.1	.....

(See Tables on Pages 144-146)

Results of Exploratory Drilling in April and First 4 Months, 1950-1949, by Districts

State or District	MONTH OF APRIL, 1950													FIRST FOUR MONTHS, 1950															
	Productive Tests									Total Productive	Unproductive Tests			Total Exploratory Tests	Productive Tests								Total Productive		Unproductive Tests			Total Dry		Total Exploratory Tests	
	New Fields			New Pays			Extensions								New Fields			New Pays			Extensions									
	Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas		Wildcats	New Pays	Outposts		Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas	4 Mo. 1950	4 Mo. 1949	Wildcats	New Pays	Outposts	4 Mo. 1950	4 Mo. 1949	4 Mo. 1950	4 Mo. 1949
Alabama	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	1	...	...	...	...	...	...	1	...	6	...	...	6	6	7	6
Arizona	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	3
Arkansas	2	...	...	...	...	...	...	...	...	2	5	...	...	7	3	1	...	...	...	...	...	...	...	4	4	22	...	2	24	14	28	18
California	1	...	...	1	...	...	1	...	...	3	32	1	...	36	7	...	1	2	...	...	4	...	...	15	17	108	2	5	115	80	130	97
Colorado	...	...	...	...	...	...	...	...	...	...	6	...	...	6	...	...	...	...	...	...	...	...	...	...	...	10	...	1	11	8	11	8
Florida	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	4	7	4	7
Georgia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	3	3	3	3
Idaho	...	...	...	...	...	...	...	...	...	...	2	...	...	2	...	...	...	...	...	...	...	...	...	...	...	3	...	...	3	...	3	...
Illinois	...	...	...	...	...	...	4	...	...	4	19	...	...	23	6	...	...	4	...	...	19	...	...	29	25	150	...	...	150	133	179	158
Indiana	2	...	...	...	...	...	...	...	...	2	27	...	...	29	10	...	...	...	...	...	1	...	...	11	14	109	...	3	112	130	123	144
Kansas	9	...	...	...	...	...	...	...	...	9	56	...	...	65	30	...	1	...	...	...	...	...	...	31	26	148	...	...	158	112	179	138
Kentucky	1	...	...	...	...	...	...	...	...	1	5	...	...	6	2	...	1	...	...	...	...	...	...	3	2	13	...	...	13	10	16	12
Louisiana	1	2	...	1	...	1	1	...	...	6	19	...	...	25	8	6	2	5	2	2	5	...	1	31	40	62	1	...	63	63	94	103
North Louisiana	...	...	...	...	...	1	1	...	...	2	5	...	...	7	1	...	...	...	2	2	2	...	1	8	11	25	1	...	26	31	34	42
South Louisiana	1	2	...	1	...	...	...	...	...	4	14	...	...	18	7	6	2	5	...	...	3	...	...	23	29	37	...	...	37	32	60	61
Maryland	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	1	...
Michigan	3	...	2	...	...	...	...	...	...	5	18	...	...	23	10	...	3	1	...	...	...	...	...	14	11	85	...	...	85	114	99	125
Mississippi	4	1	...	...	...	...	...	...	...	5	13	...	1	19	7	2	...	1	...	...	...	1	...	11	3	4	8	...	51	34	62	37
Missouri	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	1	2	1
Montana	...	...	...	...	...	...	1	...	...	1	9	...	...	10	...	...	...	...	...	...	1	...	...	1	1	18	...	...	18	7	19	8
Nebraska	...	...	...	...	...	...	1	...	...	1	2	...	...	3	...	...	1	...	...	...	1	...	1	3	...	11	...	...	11	...	14	...
New Mexico	2	...	...	...	...	...	1	...	...	3	3	...	1	7	7	...	...	3	...	...	4	...	...	14	5	16	...	3	19	14	33	19
Ohio	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1	...	1	2	3	5	...	...	5	14	7	17
Oklahoma	7	...	...	2	...	...	3	...	...	12	35	...	...	47	24	...	2	9	...	...	7	1	1	44	35	141	...	...	141	144	185	179
Pennsylvania	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	2
South Dakota	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2	...	2	...
Tennessee	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	3	...	...	3	7	3	8
Texas	33	2	1	7	1	...	8	...	1	53	195	...	7	255	106	14	25	55	2	3	41	1	3	250	285	817	1	62	880	802	1130	1087
Dist. 1 S. Central	1	...	...	...	...	...	...	...	...	1	12	...	...	13	4	...	1	...	...	1	...	...	...	6	8	63	...	...	63	86	69	94
Dist. 2 Middle Gulf	...	2	...	...	1	...	...	...	...	3	13	...	...	16	4	4	5	3	1	1	...	...	...	18	11	35	...	5	40	15	58	26
Dist. 3 Upper Gulf	1	...	...	1	...	...	1	...	1	4	17	...	1	22	5	3	1	13	1	...	2	1	2	28	42	56	...	8	64	88	92	130
Dist. 4 L. Gulf-SW	...	...	1	2	...	...	...	...	...	3	26	...	...	29	6	3	7	17	...	1	...	...	...	34	42	90	...	3	93	133	127	175
Dist. 5 E. Central	1	...	...	...	...	...	...	...	...	1	4	...	...	5	1	...	...	...	...	...	1	...	...	2	2	21	...	...	21	28	23	30
Dist. 6 Northeast	...	...	...	1	...	...	1	...	...	2	3	...	...	5	2	1	...	2	...	...	2	...	1	8	9	29	1	3	33	17	41	26
Dist. 7-B N. Central	15	...	...	1	...	...	...	...	...	16	47	...	1	64	38	1	4	4	...	...	4	...	...	51	65	175	...	11	186	174	237	239
Dist. 7-C W. Cent.	...	...	...	1	...	...	...	...	...	1	17	...	1	19	5	1	...	3	...	...	5	...	...	14	9	68	...	8	76	18	90	27
Dist. 8 West	8	...	...	1	...	...	4	...	...	13	18	...	1	32	22	...	...	10	...	...	14	...	...	46	34	88	...	10	98	56	144	90
Dist. 9 North	7	...	...	...	...	...	2	...	...	9	38	...	3	50	18	1	7	3	...	...	13	...	...	42	48	188	...	14	202	145	244	193
Dist. 10 Panhandle	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	1	4	...	...	4	1	5	2
Utah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	1	4	...	...	4	5	5	6
Washington	1	...	...	...	...	...	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	1	...	1	...	...	1	...	2	...
West Virginia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	...	...	1	...	5
Wyoming	1	...	...	...	...	...	...	...	...	1	4	...	...	5	2	...	...	1	...	...	...	...	...	3	12	23	1	2	26	39	29	51
Total U. S.	67	5	3	11	1	1	20	...	1	109	452	1	9	571	223	23	37	82	4	5	84	3	8	469	490	1815	5	81	1901	1752	2370	2242



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President, National Bank of Tulsa

FALKNER C. BROACH
Vice-President, National Bank of Tulsa

W. A. BROWNLEE
Executive Vice-President National Bank of Tulsa

J. A. CHAPMAN
Investments

JOHN H. DUNKIN
Vice-President and Secretary, Brown-Dunkin Company

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President, Hanlon Oil Company

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DALE R. SNOW
Vice-President, Barnsdall Oil Company

FRANK M. SOWLE
Vice-President, National Bank of Tulsa

CHARLES A. STEELE
Attorney-at-Law

C. H. SWEET
Vice-President, National Bank of Tulsa

STATEMENT OF CONDITION

April 24, 1950

RESOURCES

Cash and Due from Banks	$43,357,990.80	
U. S. Government Securities	86,905,604.91	
Other Bonds and Warrants	5,178,599.59	$135,442,195.30
Loans and Discounts		34,426,580.83
Overdrafts		797.07
Income Receivable Accrued		464,294.28
Prepaid Expenses		93,249.59
Stock in Federal Reserve Bank		180,000.00
Bank Premises		2,000,000.00
Customers' Liability Under Acceptances		61,710.00
TOTAL		$172,668,827.07

LIABILITIES

Deposits		$160,555,018.60
Acceptances Executed		61,710.00
Income Collected, Not Earned		167,330.89
Reserve for Taxes, Interest, etc.		749,829.50
Dividends Declared*		150,000.00
Capital — Common	$ 3,000,000.00	
Surplus	3,000,000.00	
Undivided Profits and Reserves	4,984,938.08	10,984,938.08
TOTAL		$172,668,827.07

* Payable $75,000.00 July 14, 1950, $75,000.00 October 13, 1950

NATIONAL BANK OF TULSA

The Oil Bank of America

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

New Oil, Distillate and Gas Fields and New Pay Horizons Discovered in the United States in April, 1950

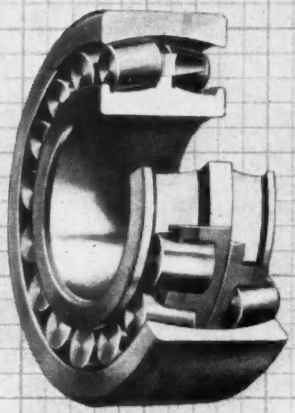
Also Important Extensions to Established Fields

COUNTY	FIELD	COMPANY, WELL AND LOCATION	Date Completed	Total Depth (Feet)	Completion Horizon (Feet)	[1]Name, Character and Age of Producing Formation	[2]Initial Production Method and Choke	Gravity of Oil
		ARKANSAS—New Oil Fields						
Ouachita		Lyons & Prentiss & McCord et al's Lester Realty Corp. 2, (OWWO), C SE SE NW 31-14s-19w, 1 mi n Curry fld.	2-10-50	2905	2140- 2155	Blossom sd; U. Cre.	F 65; ¼"	....
Union	Catesville	C. H. Murphy & Co's Pepper 1, C NE SE NE 32-18s-15w	4-23-50	7922	7574-7610	Jones sd; Jur.	F 70; 3/8"	43
		CALIFORNIA—New Oil Field						
San Luis Obispo		Superior Oil Compnay's Government 18-2, 330 fr n&el of sw cor Sect. 2-11n-28w. 3 mi nw Russell Ranch fld.	4- 1-50	6126	5635- 6105		P 397	38.6
		CALIFORNIA—New Oil Pay						
Kern	Tejon Hills	O. M. Slosson's Tejon 2, (OWDD) 527 n 867 e fr sw cor Sect. 15-11n-18w.	4-11-50	476	403- 430		P 60	28.5
		CALIFORNIA—Oil Field Extension						
Fresno	Burrel	L. M. Lockhart's Sample 1-27, 345 n 670 w fr S¼ cor Sect. 27-16s-18e. ½ mi nw extension.	4-18-50	6700	6685- 6700	Miocene	F 145	34.4
		ILLINOIS—Oil Field Extension						
Clay	Oskaloosa	The Texas Co's R. Harrell 1, NE NW NE 34-4n-5e, ¾ mi w extnsion	4-18-50	2604	2584- 2593	Bethel sd; Miss.	F 285	....
Clinton	Carlyle, N	H. Luttrell's H. Dierkes 1, SW SW SW 24-3n-3w, ¾ mi se extension	4-11-50	1165	1149- 1155	Bethel sd; Miss.	P 18; 4 wtr	....
Lawrence	Lawrence	J. Zanetis' G. Conrad 1, 330 fr sl 416 fr wl SW SW 33-3n-11w. ¾ mi ext.	4-28-50	1866	1852- 1862	McClosky li; Miss.	P 16; 4 wtr	....
Wabash	Maud Cons	J. F. Balderson's E. G. Mundy 1, NW NE SW 33-1n-13w, 1 mi w ext.	4-11-50	2661	2657- 2661	L. O'Hara li; Miss.	P 135	....
		INDIANA—New Oil Fields						
Posey	Oliver, S	Aurora, Geo. Engle & Coral Petroleum Co's W. Jackson 1, NE SW SE 10-6s-13w. 6 mi n of Mt. Vernon.	4-19-50	2880	2779- 2785	Aux Vases li; U. Miss.	P 166	....
Posey		F. B. Cline's Oliver Ogle 1, NE NE SW 32-8n-9w 1 mi fr Sullivan fld (Sullivan County.)	4-22-50	687	680- 687	Pennsylvanian	P 24	....
		KANSAS—New Oil Fields						
Barton	Boyle	Yellow Cab Co's Boyle 1, SE SW SE 17-17s-14w. ¾ mi nw Carroll pl.	4-11-50	3408	3401- 3408	Arbuckle li; Ord.	P 321	....
Barton	Hammeke	Adair, Aldeo & Alladdin's Hammeke 1, NW NW NW 17-19s-11w. 1 mi sw St. Peter pl.	4-18-50	3410	3086- 3070	Lansing li; Penn.	F 1553	....
Butler	Elbing, E	S. A. Springer's Mellor 1, SW SW NE 27-23s-4e, Reopened Elbing, E. pl.	4-14-50	2114	1799- 1805	Lansing li; Penn.	F 30; 15 wtr	....
Lyon	Bushong	Stanolind & Winkler-Koch's Cornwell 1, NE NE NE 26-16s-10e. ½ mi s of Bushong.	4-22-50	2967	2950- 2967	Hunton li; Devo.	P 257	....
Rice	Glen Sherrald	Vickers Petroleum Co's Heiken 1, SE SE SW 20-18s-10w	4-15-50	3270	3118- 3123	Lansing li; Penn.	P 176; 4 wtr	....
Rooks	Amboy	Heathman Drilling Co's Williams 1, NW NW NW 16-10s-20w. ½ mi sw sw of Palco SE. pl.	4-20-50	3821	3812- 3821	Arbuckle li; Ord.	P 352	....
Rooks	Berland, N	Francis O&G and B&R Drlg. Co's Pywell 1, SW SW SW 31-9s-19w. 1 mi n of Berland pl.	3-21-50	3780	3768- 3780	Arbuckle li; Ord.	P 133	....
Stafford	Kowalsky, SW	Phillips & Hanson's Fischer 1, SE SW NW 6-21s-11w. 1½ mi sw Kowalsky pl.	4-19-50	3461	3424- 3461	Arbuckle li; Ord.	P 202	....
Stafford		Westgate-Greenland & Mallard Drlg. Co's Doran 1, SE NE NE 14-21s-13w, 1 mi e of Rothgarn pl.	4-12-50	3553	3544- 3553	Arbuckle li; Ord.	P 186	....
		KENTUCKY—New Oil Field						
Henderson		J. Resnik & C. P. Chandler's Chas. Trigg 1, SW NE NE 21-P-21, 2 mi s Smith mills.	4-18-50	2588	2586- 2588	McClosky li; Miss.	P 80	....
		NORTH LOUISIANA—Oil Field Extension						
Sabine	Converse	Lawrence Potter et al's Long Bell Lbr. 1-A (OWWO), C NW SW NW Sect. 5-8n-13w.	4- 4-50	2142	1995- 2005		P 42; 36 wtr	41
		NORTH LOUISIANA—New Gas Pay						
Union	Monroe	Southern Carbon Co's Pilgreen 1, 1314 fr sl 1985 fr el Sect. 29-22n-3e.	4- 3-50	3200	3045- 3052	Travis Peak sd; L. Cre.	0.8 mln; open	....
		SOUTH LOUISIANA—New Oil Field						
St. Mary		Magnolia Pet. Co's St. Lse. 694 1-A, 200 fr wl 2293 fr nl of Blk. 125, 25 mi in Gulf of Mexico.	4-15-50	11672	11648-11658		F 614; 4/16"	34.4
		SOUTH LOUISIANA—New Oil Pay						
St. Mary	S. Jeanerette	Atlantic Refg. Co's Joseph A. Blanchard 7, 2136 n 2464 e fr sw cor Sect. 37-13s-9e.	4- 4-50	6650	5922- 5946		F 162; 1/8"	32.3
		SOUTH LOUISIANA—New Distillate Fields						
Acadia		Atlantic Refg. Co's Pearl R. Cowen 1, 1980 n 660 e of sw cor Sect. 18-10s-1w. 1½ mi se of Midland prospect.	3-30-50	11358	10994-11004		F 29; 4/12"	49.5
Pointe Coupee		The Texas Co's V. J. Kursweg et al 1, Sect. 24-6s-7e. 4 mi wsw of Lottie	4-30-50	11011	10324-10330		F 336; 9.4 mln; ¼";	48
		MICHIGAN—New Oil Fields						
Muskegon		Kenneth A. Fox's Gee 1, SE SW NE 15-12n-18w, White River Twp	4-23-50	2056	2050- 2056	Dundee li; Devo.	F 30	....
Newago	Bishop	Sun Oil Co's Wood 1, NW SW SE 19-13n-13w. Garfield Twp	4-25-50	2226	2224- 2226	Traverse li; Devo.	F 161	....
Ogemaw		United Driller & Producers Inc's State-Rose 3, SE SW NE 4-24n-3e. Rose Twp.	4-24-50	4270	4182- 4270	Richfield sd; Devo.	P 18	....
		MICHIGAN—New Gas Fields						
Missaukee		Brazos Oil & Gas Co's Miltner & Schaffer Comm. 1, SE NW 1-24n-7w, Pioneer Twp.	4-12-50	4708	2670- 2671	Traverse li; Devo.	14.5 mln	....
Tuscola		C. W. Collin's Mullen 1, SE SE SE 17-14n-10e, Elmwood Twp	4-22-50	1885	1880- 1885	Traverse li; Devo.	3.5 mln	....
		MISSISSIPPI—New Oil Fields						
Adams		Humble O&R Co's Lucy E. Barksdale 1, Sect. 26-5n-3w	4- 6-50	6580	6571- 6573	Wilcox sd; Eoc.	F 198; ¼"	41.8
Adams		Humble O&R Co's Caroline F. Blake 2, Sect. 23-5n-3w, 1¼ mi nw Ellisile fld.	4-28-50	6436	6431- 6436	Parker Wilcox sd; Eoc.	F 176; 1/8"	40.6
Adams	Glen Aubin	J. D. Reese et al's Geo. W. Armstrong 1, Sect. 19-5n-3w	4-25-50	7022	6588- 6591	Wilcox sd; Eoc.	P 50; 60 wtr	36
Lincoln	"Lincoln, W."	Pan Am Prod. Co's S. J. Holloway Jr. 1, C SW NW 23-6n-6e, 8 mi w of Cold Springs.	4-10-50	10718	10672-10684	L. Tuscaloosa sd; U. Cre.	F 150; 4/12"	41.5
		MISSISSIPPI—New Distillate Field						
Adams	"Natchez, N."	Humble O&R Co's James Giles 1, Sect. 4-7n-3w. 2 mi n of Natchez	4-30-50	10176	10154-10160	L. Tuscaloosa sd; U. Cre.	F 92; 0.7 mln; 4/12"	57.6
		MONTANA—Oil Field Extension						
Teton	Pondera, SW	Phillips Pet. Co's Freda Johnson 1, NE NW NE 31-27n-4w	4-18-50	2251	2204- 2221	Madison sd; Miss.	Sw 48; 108wtr	....
		NEBRASKA—Oil Field Extension						
Cheyenne	Huntsman	Ohio Oil Co's M. Gurschke 1, SW NE SE 3-14n-50w. 3 mi ne extension	4-28-50	4980	4885- 4900	Third Dakota sd; U. Cre.	P 125	....
		NEW MEXICO—New Oil Fields						
Chaves		Honolulu Oil Corp's Texas Co. State 1, 1980 fr s&el Sect. 13-11s-27e. 18 mi se of Roswell.	4- 8-50	6933	6490- 6563	Devonian li; Devo.	F 170; 11/12"	39.7
Eddy		Leonard Oil Co's Keohane-Federal 1, 330 fr s&wl Sect. 6-19s-30e. 2 mi e Turkey Track fld.	4-16-50	2250	2228- 2244	Red sd; Perm.	P 30	....
		NEW MEXICO—Oil Field Extension						
Lea	Crossroads	Magnolia Pet. Co's Santa Fe-Pacific 1-D, 660 fr s&wl SE¼ Sect. 22-9s-36e. 1 mi n extension.	4-21-50	9670	9650- 9670	Pennsylvanian	F 326; ¼"	48.5
		OKLAHOMA—New Oil Fields						
Carter		Rock Hill & G. C. Parker's Yell Estate 1, NW NW NW 35-4s-1w, 1 mi w Longe Grove Twst.	4-14-50	6518	4926- 4927	Deese sd; Penn.	P 15	29
Coal		Kenneth Nix's Gertrude Carson Jemison 1, NW NW NE 36-1n-8e	4-15-50	2312	2280- 2298	Wapanucka li; Penn.	P 2	55

[1] Character of producing formations abbreviated thus: ch, chalk; dolo, dolomite; li, limestone; sd, sandstone; sh, shale; ser, serpentine; cgl, conglomerate. Ages of formation abbreviated thus: Plio, Pliocene; Mio, Miocene; Olig, Oligocene; Eoc, Eocene; U. Cre, Upper Cretaceous; L. Cre, Lower Cretaceous; Jur, Jurassic; Tri, Triassic; Perm, Permian; Penn, Pennsylvanian; U. Miss, Upper Mississippian; L. Miss, Lower Mississippian; Devo, Devonian; Sil, Silurian; Ord, Ordovician; Cam, Cambrian.

[2] Barrels of oil per day (24 hour rate), flowing, (F), pumping (P), swabbing (Sw), or bailing (B); or million cubic feet of gas daily open flow capacity; size of choke given in inches.

rigged for action...



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The Cardwell Trailerig is built light and rugged for fast moves, quick rig-up, and heavy-duty service. Torrington Spherical Roller Bearings on the main drum shaft and gear shafts help keep it "rigged for action."

These self-aligning bearings compensate for shaft deflection and prevent development of binding stresses. They eliminate interruptions for alignment adjustments. Longer service life with lower maintenance is assured.

To keep your equipment *always* in working trim, specify Torrington Spherical Roller Bearings to handle heavy loads and shaft deflection. Call on our engineers for assistance in solving your specific bearing problems.

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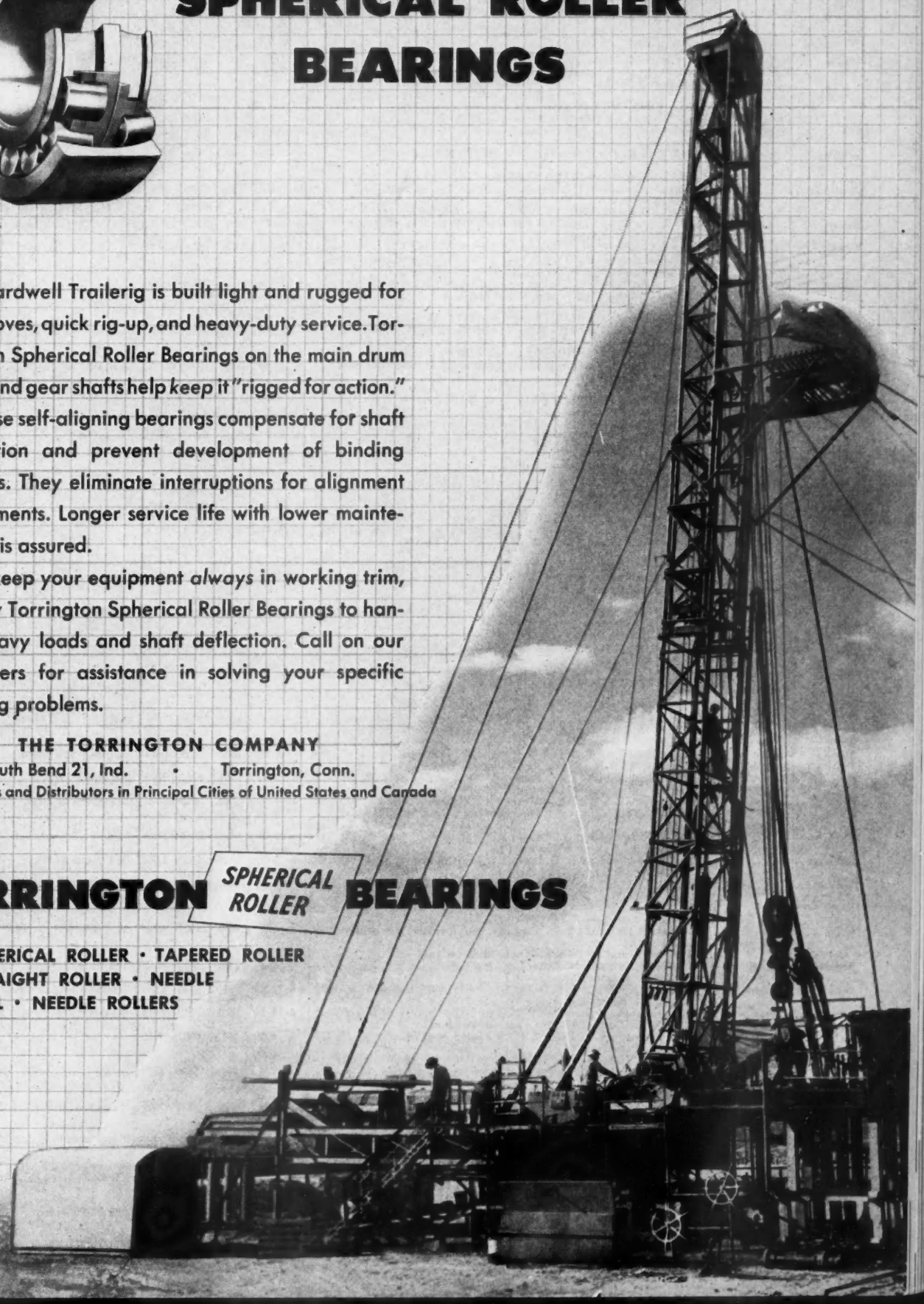

TORRINGTON *SPHERICAL ROLLER* **BEARINGS**

SPHERICAL ROLLER • TAPERED ROLLER
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BALL • NEEDLE ROLLERS

New Oil, Distillate and Gas Fields and New Pay Horizons Discovered in the United States in April, 1950

Also Important Extensions to Established Fields

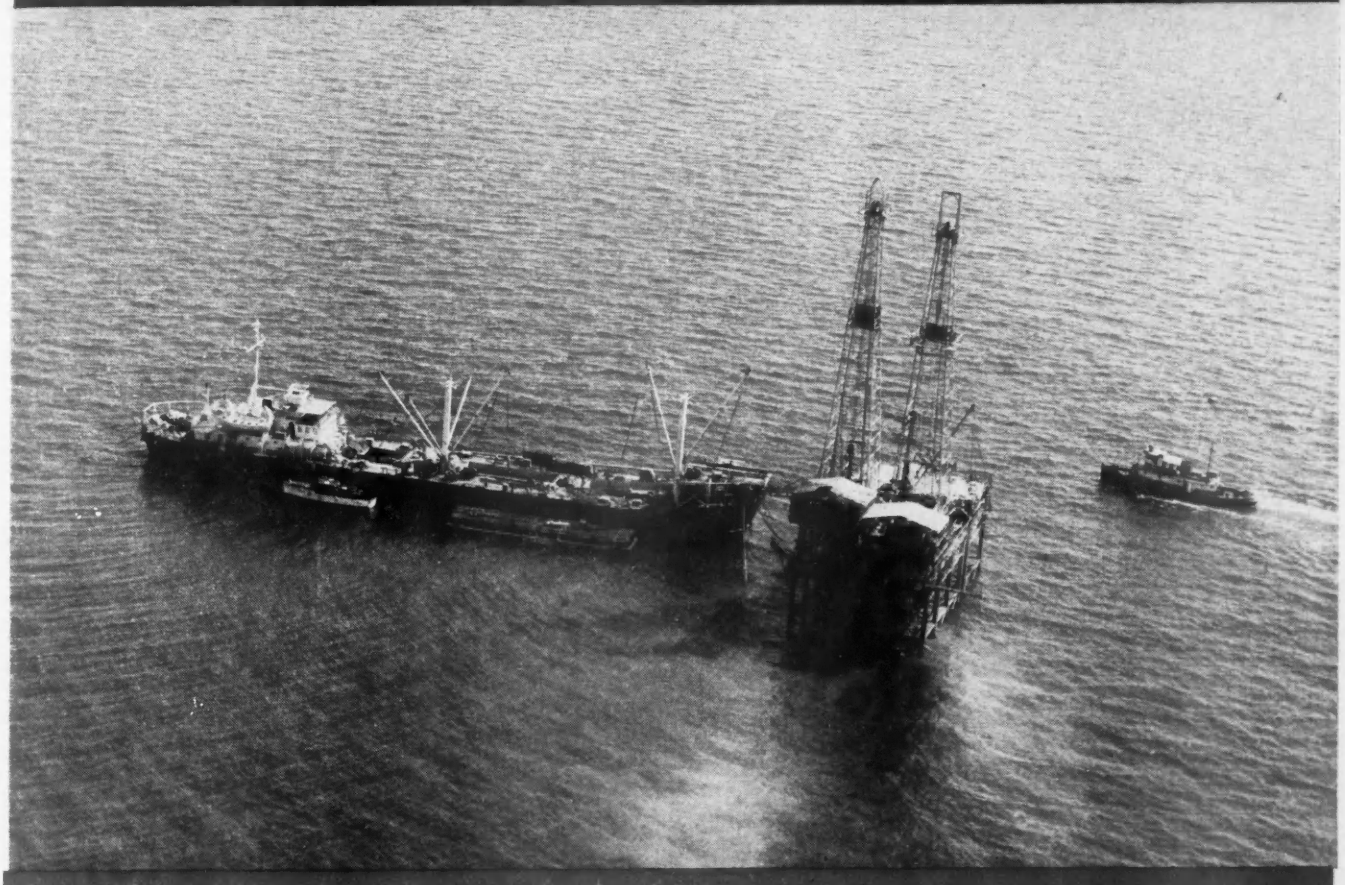
COUNTY	FIELD	COMPANY, WELL AND LOCATION	Date Completed	Total Depth (Feet)	Completion Horizon (Feet)	[1]Name, Character and Age of Producing Formation	[2]Initial Production Method and Choke	Gravity of Oil
Garfield		Fred T. Haddock et al's Ensminger 1, SW SE SE 12-24n-3w	4-17-50	4876	4568- 4620	Mississippi li; Miss.	F 3; 3 wtr	40
Osage		Peters Petroleum Co's Osage 1, E½ SE NW Sect. 7-22n-8e	4-22-50	2530	2520- 2530	Red Fork sd; Penn.	F 118	....
Payne		Thos. N. Berry's Davenport 1, SE SW NE 34-18n-6e. 4 mi w of Drumright	4-14-50	1876	1867- 1876	Layton sd; Penn.	P 10; 2 wtr	....
Washita	West Rocky	Carter Oil Co's Lee Galloway 1, NE NE NW 22-8n-18w. 20 mi se Elk City fld.	4-19-50	7617	5326- 5355	Granite Wash; Penn.	F 38; open	28
		OKLAHOMA—New Oil Pays						
Hughes	Benjamin	J. A. Chapman's McKan 5, NW SW NE 14-8n-8e	4-22-50	2208	2095- 2110	Earlsboro sd; Penn.	P 6	....
Payne	March, N	Woods Drilling Co's Mansfield 1, C W½W½SW 5-18n-5e. Between March and Norfolk W. flds.	4- 6-50	3710	3661- 3677	Wilcox sd; Ord.	P 23; 3 wtr	....
		OKLAHOMA—Oil Field Extensions						
Creek	Cushing, E	Tilley Drilling Co's Vincent 1, N½SW SE 35-19n-7e	4- 2-50	2727	2686- 2710	Red Fork sd; Penn.	F 75; ½"	....
Noble	Ceres, S	Sinclair Oil & Gas Co's Anice Sullins 2, NE NW NE 12-23n-1w. 1½ mi n extension.	4-12-50	4469	4411- 4427	Red Fork sd; Penn.	F 75; ⅛"	....
Okfuskee	Deaner	Double R Drilling Co's Fleming 1, NW SW NE 17-11n-11e	4-13-50	2890	2627- 2639	Gilcrease sd; Penn.	F 120; 70 wtr. 11/64"	....
		TEXAS—District 1 (SOUTH CENTRAL)—New Oil Field						
Guadalupe		Freeman O. Crenshaw's I. A. Echels 1, on 143-ac. Lse., E. Smith Lge. 4 mi ne of Lavernia.	4-17-50	1008	700- 785		P 2	....
		TEXAS—District 2 (MIDDLE GULF)—New Distillate Fields						
DeWitt		Shell Oil Co's Hubert Heaton 1, 4350 fr nel 2350 fr sel of Thomas Berry Sur. 6 mi se of Stratton.	4- 6-50	9000	7727- 7750		F 152; 7.7 mln; 8/64"	56.8
Wilson		Hewitt & Dougherty's T. D. Manford 1, 3664 fr nwly nwl 1789 fr swly swl of 3100-ac Lse, in Jose F. Rodriguez Sur. 6 mi. nw of Gillette.	4-12-50	7315	4279- 4283		no gge; 10 mln; open	....
		TEXAS—District 2 (MIDDLE GULF)—New Distillate Pay						
Refugio	Wyrick	Clymore Petroleum Corp's Rettye O. Morris 4, 950 fr nwl 1690 fr nel of of Jose Maria and Juan Miguel Aldrete Sur.	4-18-50	5400	2822- 2824		no gge; 100 mln; open	....
		TEXAS—District 3 (UPPER GULF)—New Oil Field						
Hardin		General Crude Oil Co. et al's Kirby Lumber Co. 1, H. A. Hooks Sur. 2 mi w of Kountze.	4-11-50	8500	8248- 8252		F 390; ⅛"	35.8
		TEXAS—District 3 (UPPER GULF)—New Oil Pay						
Liberty	Hull	The Texas Company's Armelin Fee 8, 330 fr nl 367 fr el og 98-ac. Lse, S. Wickliff Sur.	4- 9-50	7168	7005- 7032	Cook Mountain sd; Eoc.	F 190; 8/64"	34.6
		TEXAS—District 3 (UPPER GULF)—Oil Field Extension						
Fort Bend	Thompson, S	Cecil Hagen's A. P. George 1, 500-ac. Lse. H. J. Polley Sur	3-31-50	4370	4322- 4325	Frio sd; Olig.	F 180; 8/32"	25.5
		TEXAS—District 3 (UPPER GULF)—Gas Field Extension						
Orange	Pt. Neches, N.	Lloyd H. Smith Inc's H. P. Anderson 1-A, 112.5-ac. Lse, J. Stephenson Sur. ne extension.	4- 5-50	8845	8600- 8845	Frio sd; Olig.	no gge.	....
		TEXAS—District 4 (LOWER GULF-S.W.)—New Oil Pays						
Nueces	Farenthold	Rand Morgan's Fee A-10, (OWWO) 467 fr nl of lot 5, Richard King Farm lots, Casa Blanca Gr.	4-20-50	6473	5654- 5656		F 135; ⅛"	44
Webb	Nicholson	Humble O&R Co's W. R. Nicholson 3, 660 fr sl 1320 fr el of BS&F Sur	4-14-50	8005	6050- 6055	Wilcox sd; Eoc.	F 39; ⅛"	37.7
		TEXAS—District 4 (LOWER GULF-S.W.)—New Gas Field						
Kenedy		Humble O&R Co's Santa Fe Ranch-Julian Pasture 1, 3791 s 36852 w of ne cor of San Salvador Del Tule Gr. 14 mi se of Encino.	4-26-50	12458	11058-11093		5.1 mln; open	....
		TEXAS—District 5 (EAST CENTRAL)—New Oil Field						
Falls		James E. Franks' Dr. Sam Sparks 2, 330 fr sl 770 fr el of 578-ac. Tr., J. J. Acosta Sur. 2 mi s of Satin.	4- 7-50	1144	1093- 1144	Georgetown li; L. Cre.	P 14; 12 wtr	33.8
		TEXAS—District 6 (NORTHEAST)—New Oil Pay						
Anderson	Tennessee Colony	The Texas Co's S. C. Avant 1, 100 fr nl 650 fr wl A. G. Monroe Sur	4-14-50	9070	9011- 9031	L. Rodessa li; Cre.	F 135; ⅛"	47.8
		TEXAS—District 6 (NORTHEAST)—Oil Field Extension						
Wood	Pine Mills	B. B. Orr's Childress 1, 220 fr sl 330 fr el West Walker Sur. 1 mi n ext.	4-17-50	5564	4788- 4802	Sub-Clarksville sd; U. Cre	F 223; ⅛"	25
		TEXAS—District 7-C—(WEST CENTRAL)—New Oil Pay						
Upton	Benedum	Republic Natural Gas Co's Rosa Halff Barnet 2-B, 330 fr s&wl of NE¼ Sect. 40, Blk. Y, TCRR Sur.	4- 3-50	7540	7500- 7540	Sprayberry sd; Perm.	P 33	39.5
		TEXAS—District 8—(WEST)—New Oil Fields						
Gaines		Forest Oil Corp. & Anderson-Pritchard Oil Corp's Parmer CSL 1-A, 860 fr wl 660 fr sl of Lab. 12, Lge 317, Parmer CSL Sur. 19 mi e of Flannagan Ellen fld.	4- 7-50	14150	12100-12235	Mississippian li; Miss.	F 203; ½"	41
Kent		Caroline Hunt Trust Estate's J. W. Young 1, 467 fr sl 1640 fr el of Sect. 166 Blk. G, W&NW Sur. 7½ mi nw Clairemont.	4-10-50	7232	6484- 6520	Canyon Reef li; Penn.	F 2184; ¾"	39.2
Kent		General Crude Oil Co's Percy Jones 1-A, 660 fr n&el of Sect. 79, Blk. G, W&NW Sur. ½ mi w Clairemont.	4- 3-50	6752	6742- 6752	Strawn sd; Penn.	F 384; ½"	38.7
Kent		Kewanee O&G Co's Wil 1-A, 330 fr s&wl of SW¼ Sect. 3, Blk. 5, H&GN Sur.	4- 4-50	2349	2343- 2349	San Andres li; Perm.	P 12; 52 wtr	32
Pecos	Abell 4900 Permian"	Geo. T. Abell's L. G. Byerley 1, 330 fr s&wl Lot 3, Blk 9, Sect. 29, H&GN Sur.	4- 2-50	5814	4915- 4940		F 120; ⅜"	41
Pecos		LaGloria Corp's Arthur A. Sullivan 1, 660 fr n&wl of Sect. 68, Blk 11, H&GN Sur. 5 mi nw Wentz Ellen fld.	4-29-50	4632	3085- 3122	Clearfork li; Perm.	P 97	39.2
Sterling		M&M Production Co's D. C. Durham 1, 330 fr nl 1660 fr wl of Sect. 19, Blk 12, SPRR Sur. 2½ mi s Sterling City.	4- 3-50	1476	1460- 1476	San Andres li; Perm.	P 32	33
Yoakum		Honolulu Oil Corp's Paul Cobb et al 1, 660 fr sl 1980 fr wl Sect. 381, Blk D, J. H. Gibson Sur. 2½ mi ne Ownby pl.	4- 5-50	11662	6035- 6200	Glorietta li; Perm.	P 189; 111 wtr	23
		TEXAS—District 8—(WEST)—New Oil Pay						
Kent	Cogdell	Chapman & McFarlin's D. M. Cogdell 6, 3252 fr sl 2044 fr el of Sect. 716, Blk 97, H&TC Sur.	4-14-50	4970	4906- 4930	Wolfcamp li; L. Perm.	F 1233; ¾"	43.2
		TEXAS—District 8—(WEST)—Oil Field Extensions						
Andrews	Means	Western Drlg. Co's M. M. Fisher 1, 660 fr el 1980 fr sl of Sect. 7, Blk A-36, PSL Sur. 1 mi w extension.	4-18-50	4561	4518- 4561	Grayburg sd; Perm.	P 190	30
Borden	Vincent, N	Castleman & O'Neill's T. L. Griffin 1-A, 660 fr nl 467 fr el of NE¼ Sect. 51, Blk 25, H&TC Sur. 1 mi w extension.	4-11-50	6889	6860- 6889	Canyon Reef li; Penn.	F 2010; 1"	46
Dawson	Sprayberry Deep	Seaboard Oil Co. of Deleware's P. W. Jeter 1-D, 1880 fr el 660 fr sl of Sect. 36, Blk 34, T-5-N, T&P Sur. ½ mi ne extension.	4-19-50	6832	6542- 6832	Sprayberry sd; Perm.	F 262; 26 wtr; 3/8"	38.8
Kent	Cogdell	D. D. Feldman's P. L. Fuller 1, 467 fr n&el of Sect. 703, Blk 97, H&TC Sur. 1 mi w extension.	4- 8-50	6915	6881- 6915	Canyon Reef li; Penn.	F 602; ¾"	42
		WASHINGTON—New Oil Field						
Grays Harbor		Union Oil Company's State 3, 380 s 694 w fr nwl of lot 3, Sect. 15-18n-12w.	4-12-50	9344	3670- 3870		P 6	39
		WYOMING—New Oil Field						
Johnson	Meadow Creek	Continental Oil Co's Unit 1, NE NE NW 11-41n-78w	4- 3-50	7555	7475- 7490	Lakota sd; L. Cre.	F 192; 11/64"	39

[1] Character of producing formations abbreviated thus: ch, chalk; dolo, dolomite; li, limestone; sd, sandstone; sh, shale; ser, serpentine; cgl, conglomerate. Ages of formation abbreviated thus: Plio, Pliocene; Mio, Miocene; Olig, Oligocene; Eoc, Eocene; U. Cre, Upper Cretaceous; L. Cre, Lower Cretaceous; Jur, Jurassic; Tri, Triassic; Perm, Permian; Penn, Pennsylvanian; U. Miss, Upper Mississippian; L. Miss, Lower Mississippian; Devo, Devonian; Sil, Silurian; Ord, Ordovician; Cam, Cambrian.

[2] Barrels of oil per day (24 hour rate), flowing, (F), pumping (P), swabbing (Sw), or bailing (B); or million cubic feet of gas daily open flow capacity; size of choke given in inches.

DUAL RIG PLATFORM Reduces Offshore Drilling Costs

By J. E. KASTROP, Gulf Coast District Editor



An unusual spectacle in drilling operations is presented by this aerial view of The California Company's dual rig platform at Bay Marchand.

UNIQUE in drilling operations anywhere, offshore or on land, is The California Company's dual rig platform in the Bay Marchand field just five miles off the coast of Lafourche Parish, Louisiana. There in the unprotected waters of the Gulf where the shore line is barely visible, another great stride is being made in the advancement of drilling oil wells in deep water. By combining two heavy-duty power rigs into a single steel piling structure, and servicing them with only one floating tender, drilling costs are being slashed by 30 to 35 percent. These drastic reductions are based upon operating experiences in the field with the former single rig platform serviced by one floating tender. Of considerable importance, too, in addition to the large saving offered in drilling costs by this unusual arrangement, is the speed with which the field can be fully developed by utilizing this method.

There are numerous features which account for this reduction in costs. The largest single saving may be attributed to the elimination of one floating tender for every two rigs operating in the field. Whether or not the tender is self-propelled or "dead" in the water, it represents a substantial part of the daily operating costs, which now can be divided between two rigs. A backlog of several years' experience in offshore drilling in the Gulf of Mexico indicates that a self-propelled tender has several advantages over the non-propelled vessels, and the former is finding increased popularity. Floating tenders not equipped with engines and propellers must be attended by large tugs, each costing upwards of $500 per day. In the self-propelled vessel, a complete complement of operating personnel must be on board at all times to comply with U. S. Coast Guard regulations. Both types of vessels are quite costly, and the elimination of one such vessel for every two rigs in the development program of the field represents a big saving in over-all costs.

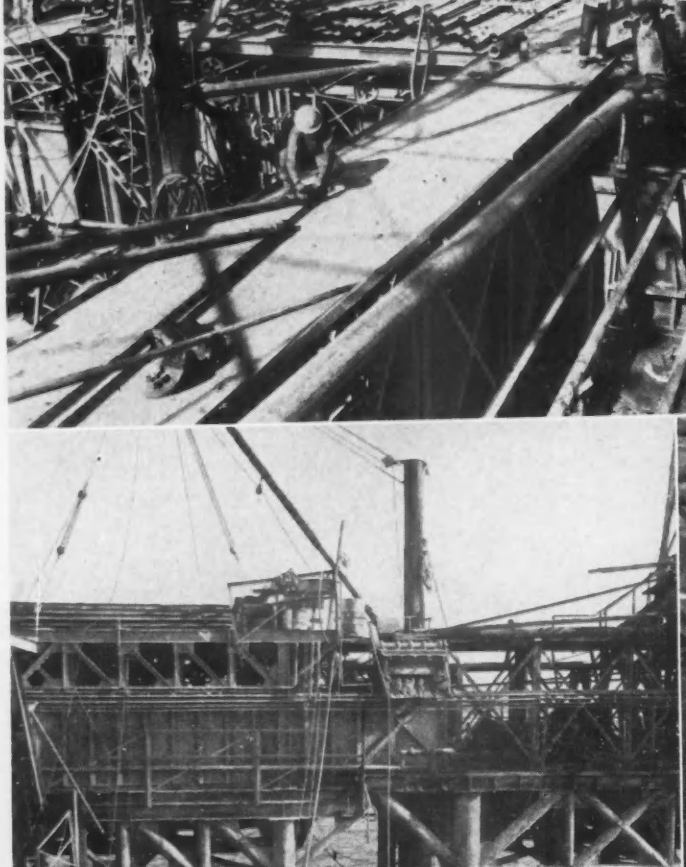
THE MOST unusual drilling operation to be witnessed anywhere may be found in The California Company's Bay Marchand field. Modern drilling equipment has been combined with tried and proved methods, and with a brand-new wrinkle for offshore drilling. Two rigs running on one platform are reducing drilling costs from 30 to 35 percent.

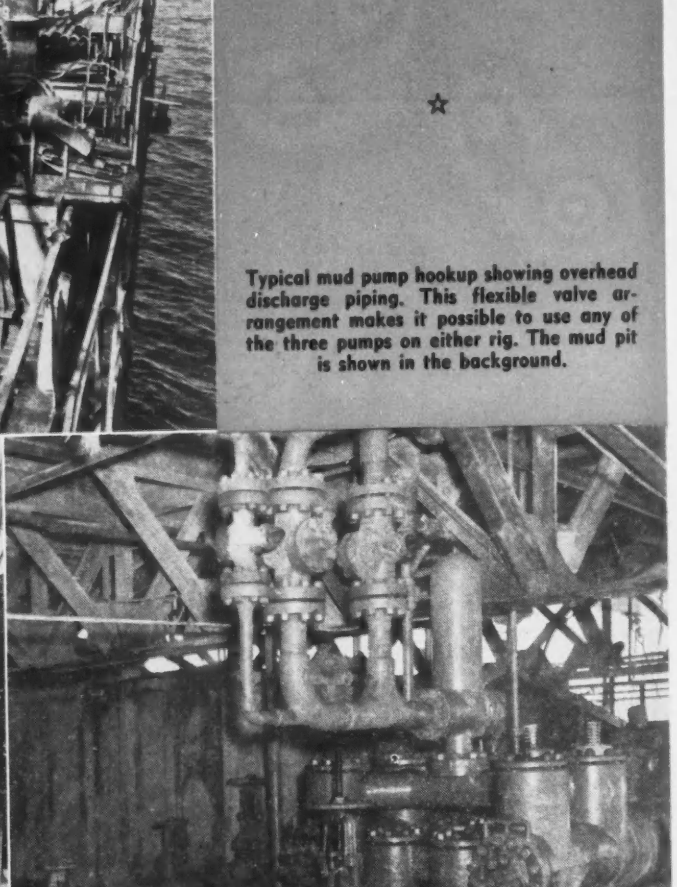
Many additional advantages result in

The pipe racks which serve both rigs as seen from the derrick floor of one rig. Note the platforms added to the catwalk to fill the gap as the rig is skidded for each well. A spare string of drill pipe is stacked on the pipe rack. The king post and large boom enable the pipe and casing to be transferred from the tender to the platform.

☆

Typical mud pump hookup showing overhead discharge piping. This flexible valve arrangement makes it possible to use any of the three pumps on either rig. The mud pit is shown in the background.

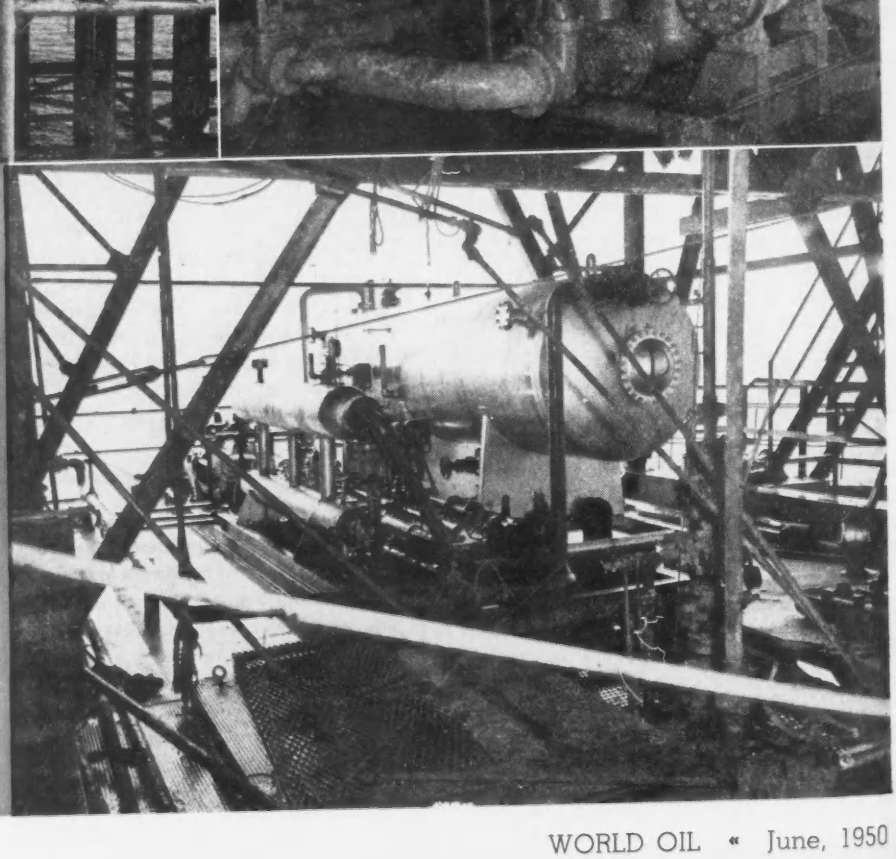




The king post extending above the catwalk and pipe rack serves as a bridle point where connecting pipes terminate that hold the two structures to each other. The mud pits and settling tank are resting on the main deck. The shale shaker is located over the settling tank.

☆

Oil and gas separation equipment and water knockout mounted on the main deck under the engine substructure of one rig.



cutting expenditures. The time and number of vessels required to serve each platform are about the same, whether there are two or just one rig involved. The problem of transporting crews, standby boats, tugs, barges, water hauls, etc., is appreciably lessened by doubling up on a single structure such as described.

Servicing two rigs from one floating tender may at first appear to be impractical, less safe and undesirable. On the contrary, after completing 11 wells on one dual structure with two power rigs, the arrangement has proved to be satisfactory from an operational standpoint, in addition to effecting a tremendous saving.

From the material supply problem, this new drilling operation has distinct advantages over former methods. Supplies of drilling fluid materials, casing, reserve mud, water and fuel storage, as well as other consumable items are stored in double amounts on the floating tender. An extra string of drill pipe and drill collars are stacked on the pipe racks on the platform. In the event of trouble with either well, there is always adequate material on hand to fulfill emergency requirements. If one well begins to kick due to unusually high gas pressure, a large supply of weighting material on hand may be drawn upon to bring the situation back to normal control. Other emergencies or unusual operations requiring special attention may be handled in the same manner, that is, by drawing upon reserves set up for either rig. After the emergency is over, material stocks are replenished back to their normal levels.

On such offshore structures, each rig is normally furnished with a complete and separate logging unit and cementing unit supplied and serviced by the owner companies. In the case of the dual rig, only one unit of each type is required to service both rigs, for their drilling programs are arranged, as far as practical, so that both wells will not require logging at the same time, or so both wells will not be running casing simultaneously.

Mud Systems

The dual rig arrangement offers another advantage in the design and equipment required for the drilling mud system. Normally, each rig requires two large mud pumps and prime movers. One pump circulates the fluid while the second serves as a standby and for mixing new mud and jetting the pits. On the double rig hookup, only three large power-driven pumps are needed for two rigs. The third pump acts as a standby for either rig.

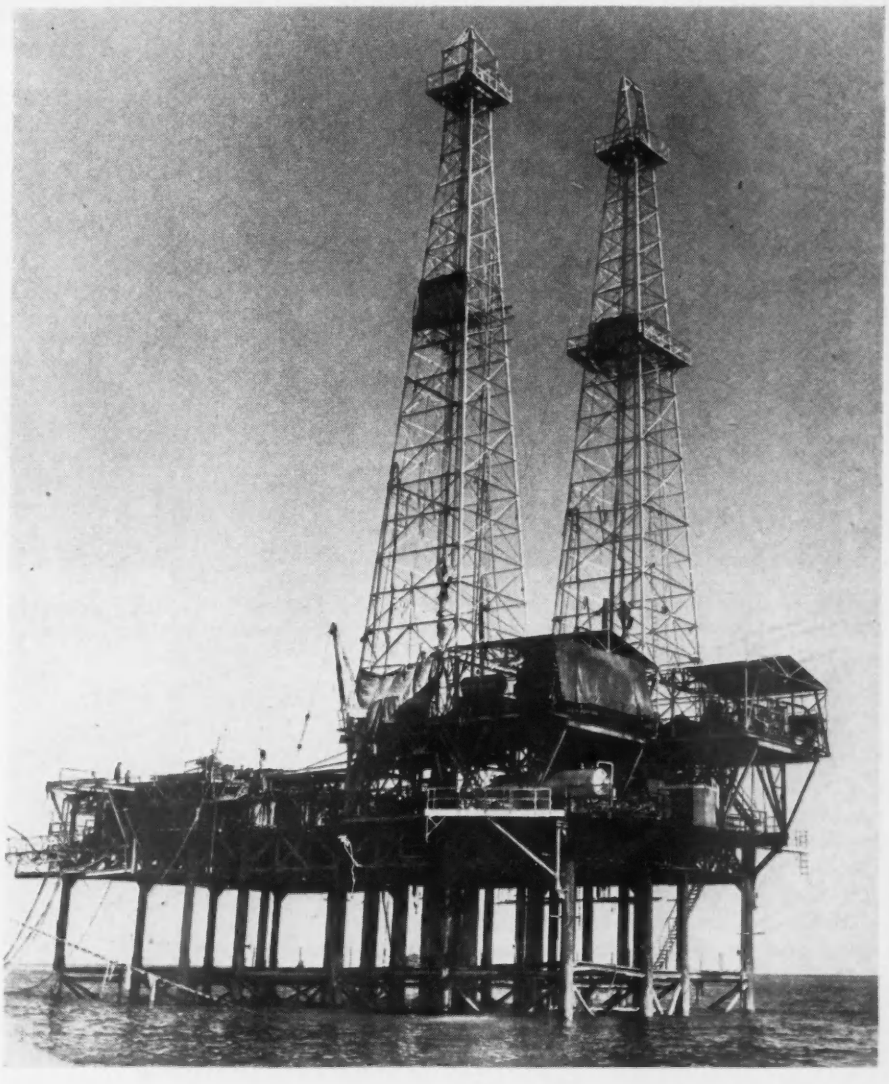
The mud system is designed so that any pump can be made to serve either rig. A flexible piping and valve arrangement makes it possible to compound any two pumps, either in series or in parallel. Valves and piping are visible, some overhead, others on the deck, so the operator may easily make the necessary changes to connect any pump into the system as the situation requires. It should be made clear, however, that both rigs do not use a common mud pit and sump. Each well is served by a separate system, quite similar in all respects to the normal mud system of wells drilling on land where mud tanks are used.

The system of each rig contains a large reserve mud tank as well as a steel sump tank, to handle the mud problems of each well separately. The drilling tender also serves as an additional source of reserve mud, and serves as storage for cement.

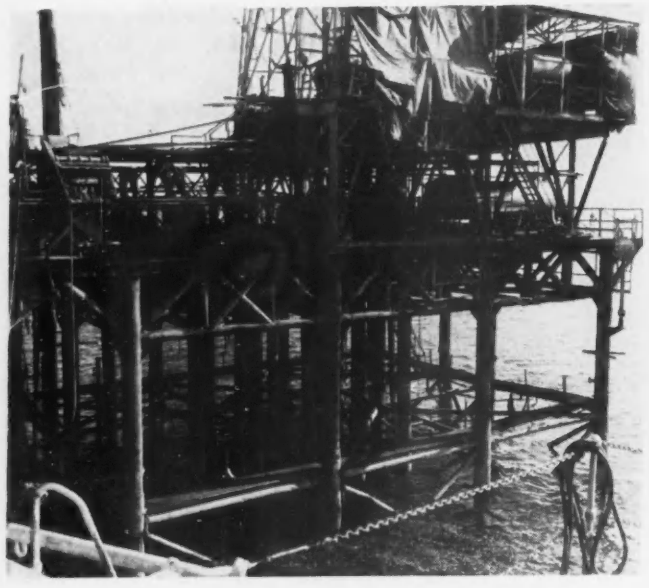
Mud pumps and a cementing unit formerly used on other offshore locations remain on the drilling tender, and by means of flexible hoses connected to the platform, both mud and cement may be pumped to either well. Mud from the tender is moved to either sump on the platform by the mud pumps located in the tender's pump room.

Fresh water on the platform is supplied through a fresh water system maintained on the tender, where large volumes of water may be stored. It is transported by underwater pipe line from shore. This water is used for mixing mud and cleaning equipment, etc., where an untreated water is permissible. Drinking water comes from a different supply tank on the tender.

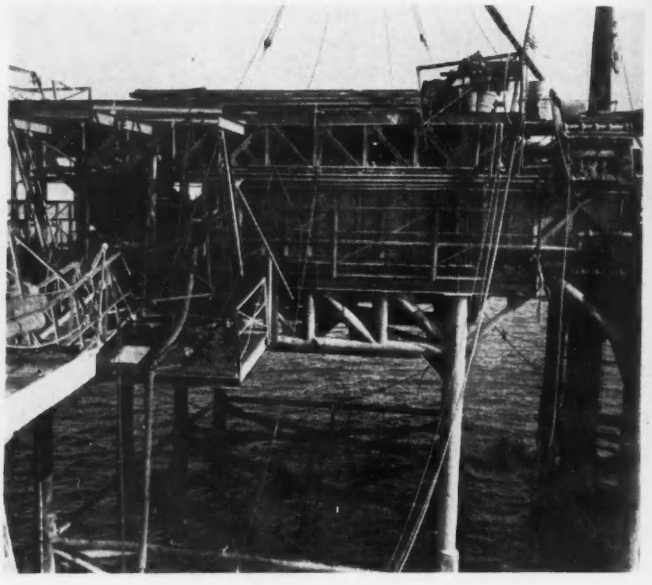
The discovery well and many subsequent wells in the Bay Marchand field were drilled from heavy steel piling structures elevated about 35 feet above mean high water. These structures, just large enough to accommodate the drilling rig and pipe racks, were serviced by a floating tender, normally a converted war-time LST (Landing-Ship-Tank). One of these tenders is self-propelled; others are dependent upon large tugs for transfer from one location to the other. By means of heavy anchors and winch lines, the vessels can



Not a double exposure, but twin rigs operating from the same offshore drilling structure. Offset drilling is not a problem here where Noble Drilling Company is contracting for The California Company.



Some detail of platform construction is shown here. Note that both derrick substructure and engine substructure are mounted on common H-beams which facilitate skidding the rig.



Juncture between main drilling platform and pipe rack platform is shown at right. Pipe rack substructure rests on platform superstructure. View taken from floating drilling tender.

be moved away from the structure in case of a storm.

Original structures provided for drilling five or six directional wells. The complete rig and substructure were skidded away from the pipe racks as each well was drilled. The next step in reducing drilling costs was to construct a platform large enough to accommodate two rows of wells, with five per row.

That step involved the same type of structure, but utilized two drilling rigs operating simultaneously and served by only one floating tender.

Operating Personnel

Operating personnel required for offshore drilling is substantially reduced through the use of the double derrick arrangement and one tender. There is a need for only one crew on the tender, which includes seamen, cooks, electrician, welders, etc. At this writing, there are four drilling crews of six men per crew. Each crew works on 12-hour tours and is off 12 hours. The working schedule is from noon until midnight and from midnight until noon. Each man on the drilling crew works two straight weeks at the location, and is given one week of shore leave.

There is always a company engineer or superintendent on board along with a toolpusher. Two roustabout crews, each composed of six men plus a gang pusher, remain at the location. One crew works days, the other at night. The roustabout crews unload material, transfer pipe from the tender to the pipe rack, handle mud materials and cement, and do general work on the platform. In addition to the groups mentioned, there are always service company personnel on board who are constantly required by either one or the other well. Since every well is a directional hole, two directional drilling specialists are required, as well as directional survey technicians. Logging crews, cementers, and other specialists account for the remainder of personnel normally housed and fed aboard the drilling tender.

Details of Platform

The complete platform as shown in the aerial photograph consists of two independent structures tied together at the main deck level by a bridle connection. The main platform supports the load of drilling operations, while a pipe rack structure carries the weight of mud pumps, mud tanks, pipe and casing.

The main platform is supported by 16 heavy steel piles, 18 inches in diameter and about 185 feet long, and in some cases even longer. These piles are driven through templates, or jackets, which guide them into the soft, muddy bottom, and maintain a definite centering of the piles. The main jacket measures 72 feet by 60 feet from centers of corner members. Each of the 16 jackets is 50 feet long and is held rigid in one framework by connecting pipe supports. Bracing between jackets in a horizontal plane at the top consists of joining the templates with 12¾-inch outside diameter pipe, while bracing in a horizontal plane at the lower part of the jacket is with 10¾-inch diameter pipe. There are ten sections of 24-inch O.D. casing which serve as guides when drilling each of the ten wells from the main platform. Wells are spaced on eight-foot centers down each row. Rows are 36 feet apart. By adding an eleventh casing guide, another well can be drilled from the platform if the need arises.

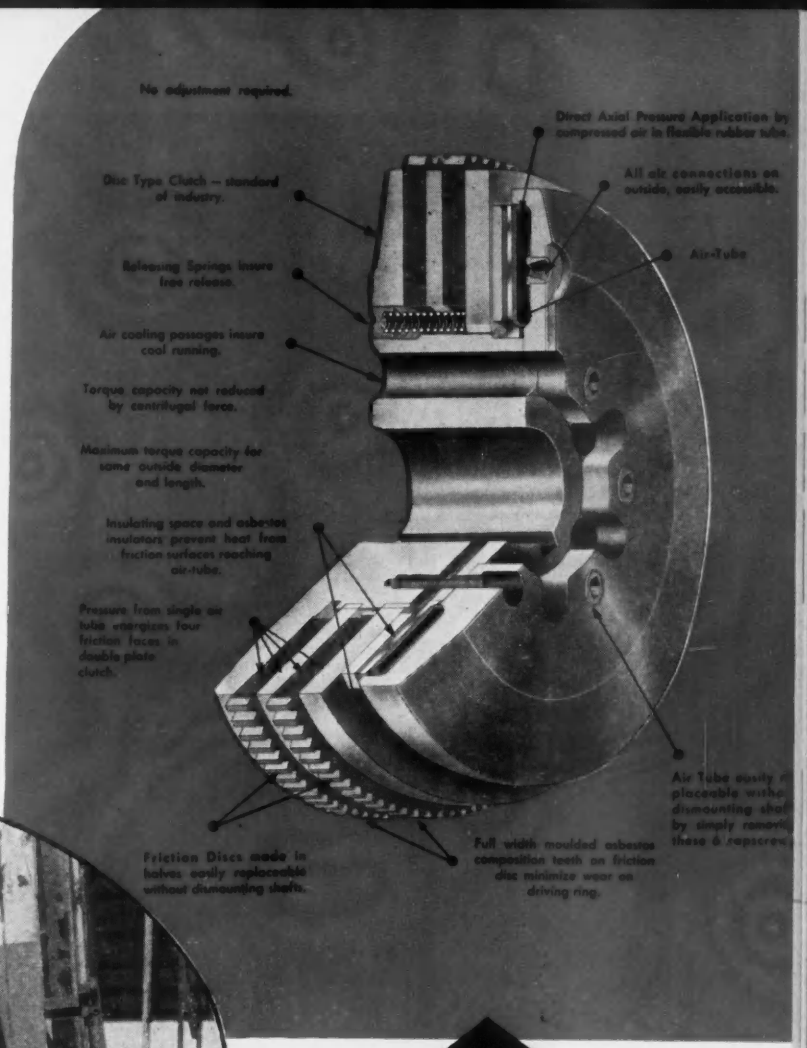
Angular bracing in the upper section is by 14-inch O.D. pipe and by 12¾-inch O.D. pipe in the lower section of the main jacket. Both horizontal and angular braces serve to steady the piling below the water line so the structure will remain rigid through storms and during normal drilling operations. A heavy board mat was incorporated in the main platform jacket on the lower end. This mat covers most of the area enclosed by the four corner legs, and is mounted on 12¾-inch O. D. cross members between the jackets. Located just ten feet from the bottom of the 50-foot jackets, this mat serves as a foundation for the jackets, and it rests directly on the unconsolidated bottom. Weight of the jackets forces the ten-foot extensions into the mud. This mat serves to hold the jackets in a vertical position during the pile driving operations, and supports only the weight of the main platform jackets. The piling driven through the jackets supports the weight imposed on the platform.

Jackets for the pipe rack platform are similarly constructed, consisting of eight 22-inch O.D. by 46-foot jackets, measuring 60 feet by 36 feet from center of corner members. Horizontal bracing consists of 12¾-inch O.D. and 10¾-inch O.D. pipe, while angle braces are 14-inch and 12¾-inch diameter pipe. A board mat was also added to the bottom of the pipe rack jacket to support the weight of the jacket upon the Gulf bottom. Both structures are designed for service in open water about 31 feet in mean average depth. The pipe rack structure is spaced 14 feet from the main platform.

After the main jackets and pipe rack

Reduce DRILLING TIME

Increase THE PAYOFF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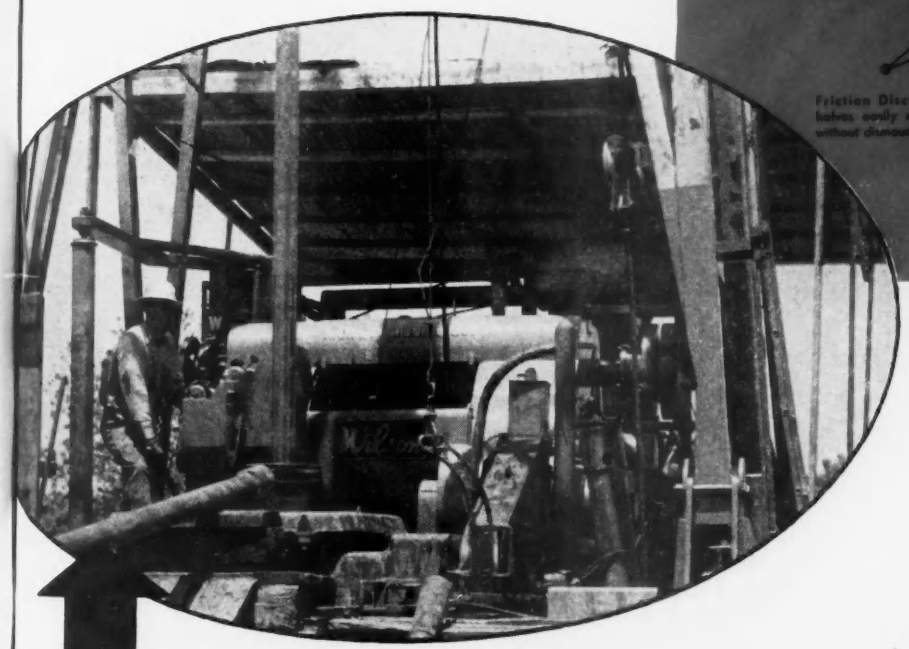

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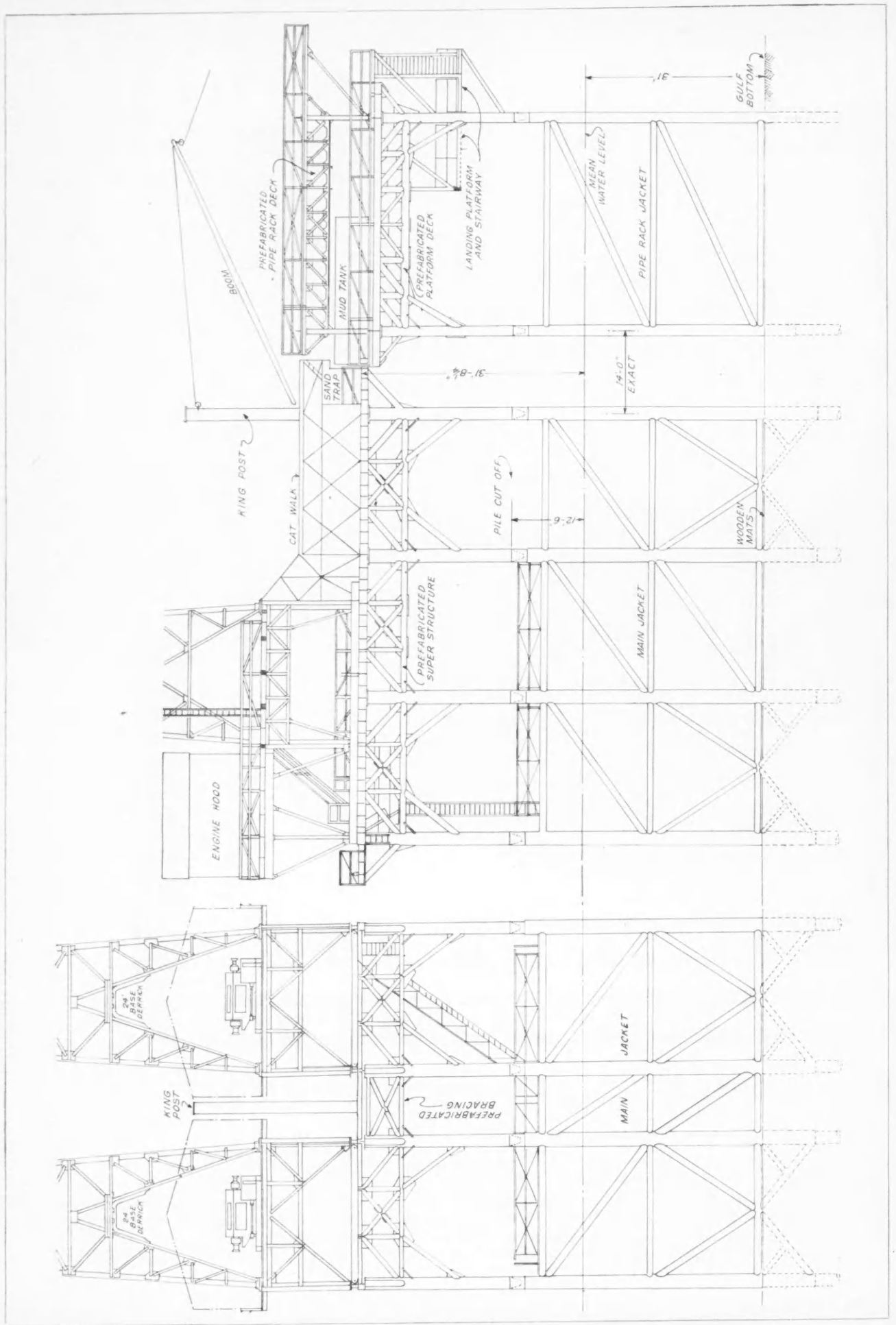

Front and side elevations of dual rig platform showing below-water bracing of main platform and pipe rack jackets. Note mat resting on mud bottom to support jackets.

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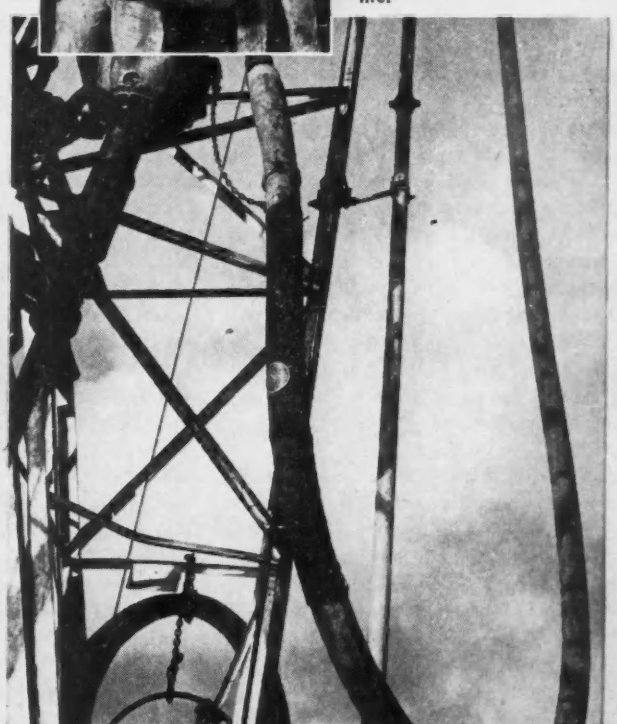

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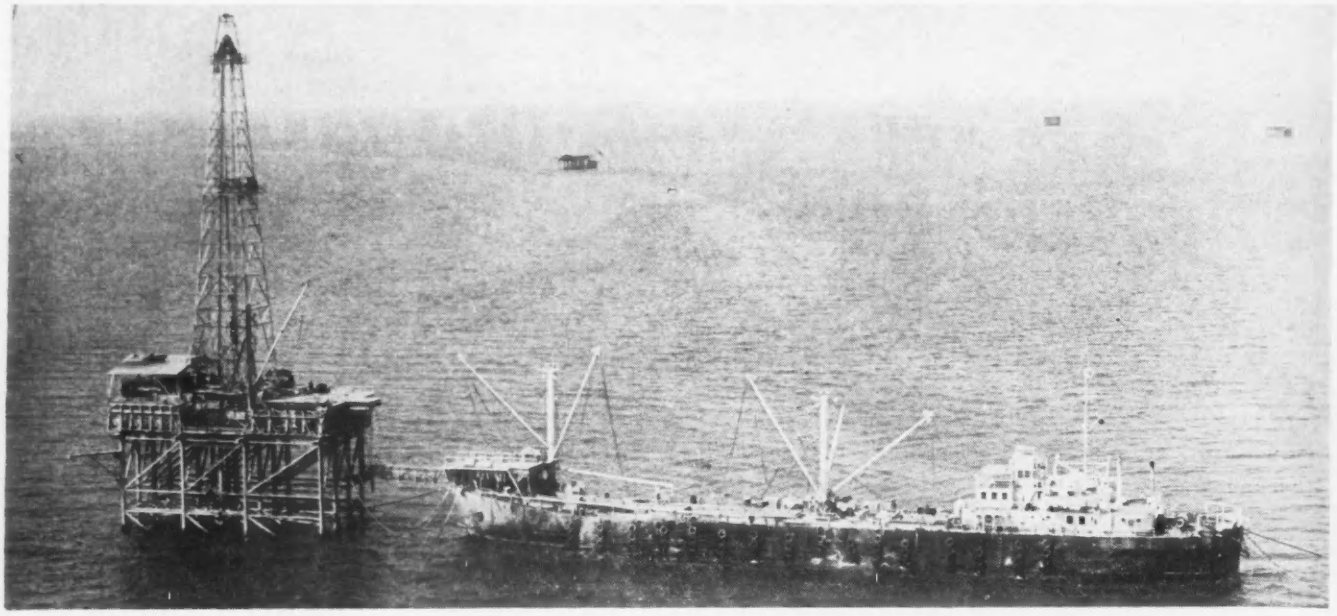
From and side elevations of dual rig platform showing below-water bracing of main platform and pipe rack jackets. Note mat resting on mud bottom to support jackets.



Earlier successful—and formerly most economical—method of drilling offshore wells utilized the single rig platform served by one drilling tender. Only five wells could be drilled from such structures.

jackets are in place and the piles have been driven, the steel pipe piles are cut off so they extend 12½ feet above mean average water level. A prefabricated superstructure for the main platform is then set in place so that the legs of the superstructure coincide with the steel pipe piles. Each leg of the superstructure is about 25 feet long, and the lower 24 inches has been coned so it will enter the piles and bring them to exact dimensions. The superstructure is then welded to the piles. The main deck, on top of the superstructure, is about 39 feet above mean water level, and is crossbraced throughout the upper six feet.

The pipe rack superstructure has legs that are slightly shorter, but its construction and installation is the same as the main platform superstructure. A prefabricated pipe rack is then placed on top of the pipe rack superstructure so that the head room between the surface of the pipe rack and main deck of the pipe rack platform is 10¾ feet. In this space are placed the three mud pumps and their prime movers, and the mud tanks serving both rigs. There are two steel mud tanks measuring 18 x 24¼ x 6¼ feet and two settling pits, 20 x 6 x 6¼ feet. The catwalk to each rig extends across the main platform and on the same level with the pipe racks.

Both derrick and engine substructures are mounted on large H-beams so that they can be skidded together down the platform. The derrick floor level extends 16¾ feet above the main deck level on the drilling platform. The derrick substructure is conventional, but the engine substructure supporting two engines has been specially designed, and can be seen in the closeup photo of the rig.

The main deck is covered with deck pads made so they can easily be removed. During the drilling of the first well by each rig, the remainder of the main deck is completely covered with these deck pads. As the rig progressively moves down the platform and drills each successive well, the deck pads are removed to accommodate the blowout preventer hookup. As each well is completed, the deck pads are cut out to fit around the conductor pipe and replaced.

The first well to be drilled on each row is adjacent to the pipe racks. As the well is completed, the derrick and engine substructure are skidded intact eight feet from the previous well. A catwalk substructure section eight feet long is added to fill the gap created when the rig was moved, thereby making the catwalk to the pipe rack continuous.

A king post 24 inches in diameter was installed halfway between either side of the main platform and eight feet from the end next to the pipe racks, to which it was bridled. The king post served several purposes. It supported a large boom used in transferring pipe and equipment from the floating drilling tender to the pipe rack. Such a transfer required two electrically-driven hoists coordinated to make the lift from the LST to the platform. It also made possible the location of well surveying and perforating units between the two derrick substructures on the main deck. A large pulley hinged to the king post changed the direction of cable feed up to the derrick floor where another large pulley guided the cable down the well.

Platform Salvage

When all 10 or 11 wells have been completed, the derrick and substructure, along with other drilling equipment, are transferred to another structure. Deck of the pipe racks is removed and the mud pumps and mud tanks are moved. All equipment required in the drilling operation is taken from the main deck of the platform, leaving it clear except for the two rows of christmas trees and separation equipment.

The superstructure of the pipe racks is cut loose from the piling and removed to a barge. The pipe rack jackets can be raised and also loaded aboard barges. Steel casing piles are then salvaged for use on the next location, leaving only the 72 x 60-foot main structure which now serves as a production platform.

Big Step Ahead

When the search for oil extended out into the unprotected waters of the gulf, where storms and hurricanes are to be expected, there was much skepticism that such a venture could ever be realized. At the end of the first year of offshore operations, it was definitely shown that a well could be drilled successfully and safely in deep and unprotected waters. The cost, however, was tremendous—several times that of comparable costs for land operations. As more wells were drilled and new structures were erected, a backlog of experience and confidence was gained that has been in large part responsible for the advancement of techniques developed to date in these remarkable drilling projects.

The successful completion of 11 wells from one structure by two rigs running simultaneously side by side and served by one floating tender again proves that skill, experience and expert management can beat the sea and the high costs of drilling wells in fields far from shore.

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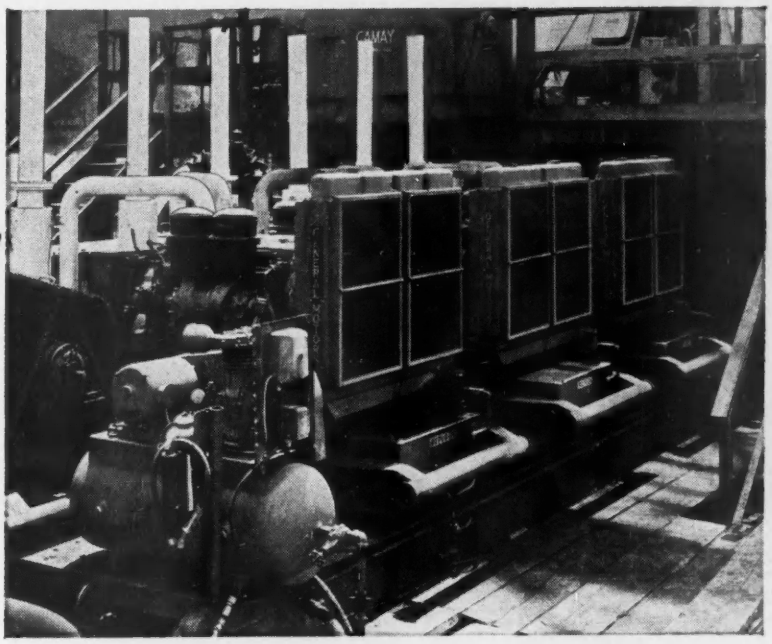

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After "re-powering," the rig was moved to Inglewood, Calif., where it *drilled 10,399 feet of 10⅝" hole in 41 days' drilling time*—a record that compares favorably with large expensive steam rigs in the area. Total fuel consumption averaged 652 gallons per day; fuel cost, $69.22 per day.

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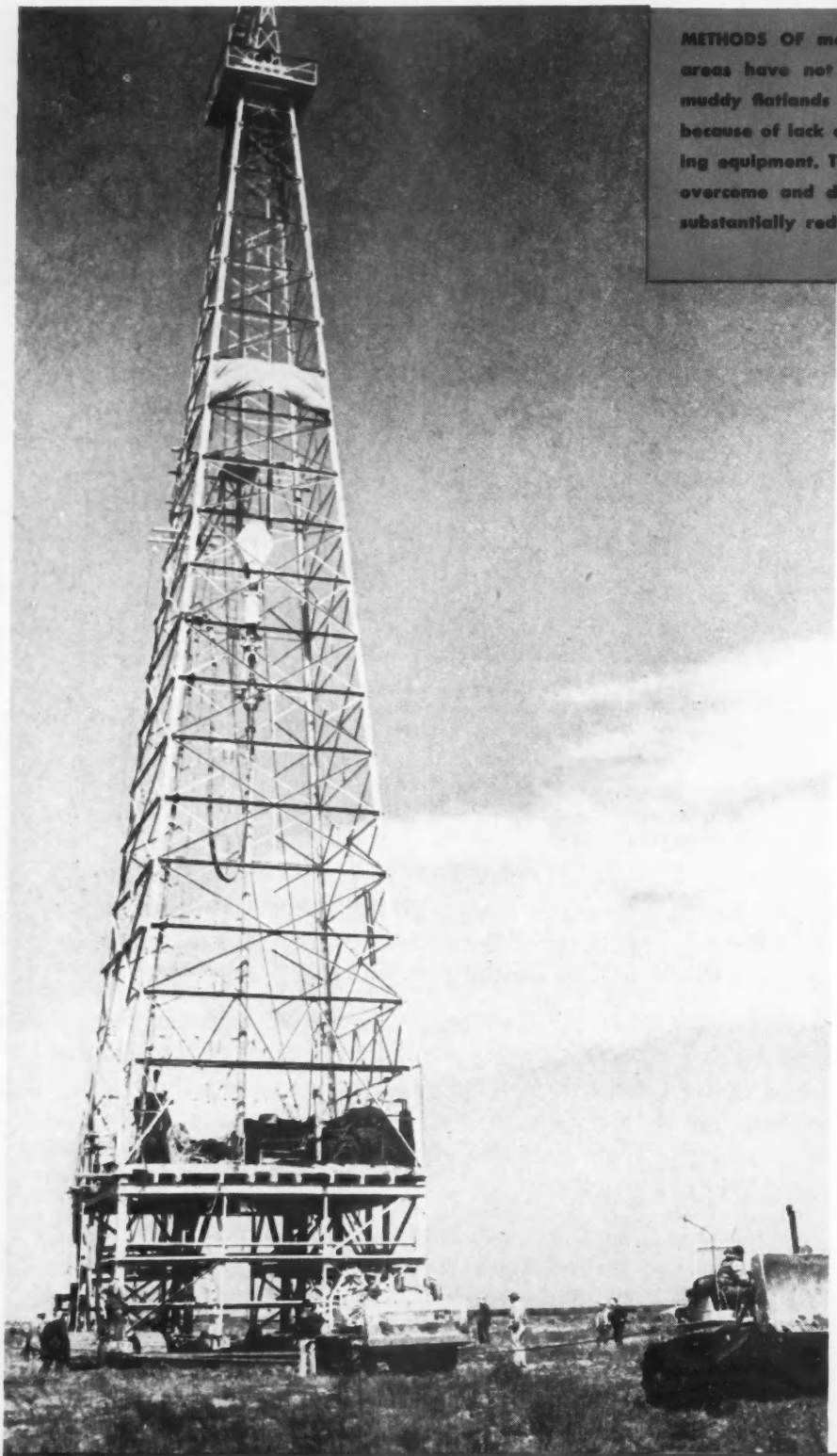


METHODS OF moving derricks intact in some areas have not been applicable to the soft muddy flatlands of the Gulf Coast in the past because of lack of bearing surface of the moving equipment. This problem has recently been overcome and derrick moving time has been substantially reduced.

Moving Day on the Gulf Coast

By MARK OLSON
International Editor

OIL well derrick moving on the Gulf Coast has been reduced from a matter of days to a few hours by the Clark Sherwood Rig Building Company of Houston. Barring obstacles such as trees or steep hills, derricks now can be moved on double-track dollies in less time than is required to move auxiliary equipment by truck. Because of the soft and muddy terrain in the coastal area east of Houston, derricks are not skidded as they sometimes are in West Texas or California. Normal moving conditions on the Gulf Coast require from five to six days tearing down, moving and rigging up, and involves the construction of board roads for the heavy trucks where regular roads are not available.

The double-track dollies used are a recent adaptation of heavy equipment motivation and are especially suited to Gulf Coast moving operations in that they will not ball up with mud or sink into the ground and create drag. The tracks are an improvement of a similar design used in some areas, having a 30-inch tread and a 104-square-foot bearing surface when the four dollies are in use.

A standard 136 x 30-foot base derrick mounted on a seven-foot substructure with the drawworks and all attached equipment was recently moved a little more than a mile in 20 minutes across soft ground to a new location. In the moves pictured in accompanying photographs, approximately two hours were required at each rig to jack the derricks up high enough to remove the sills and place the dollies under each corner and about the same time was required on the new location to let the derricks down on the sills and level them up. The total weight of the seven-foot substructure and all its

OPPOSITE PAGE: Holmes Drilling Company derrick with 14-foot substructure moving to new location in Magnolia Beach field, Calhoun County, Texas. Note equipment standing in derrick and on the floor. No stabilizing guy wires are used.

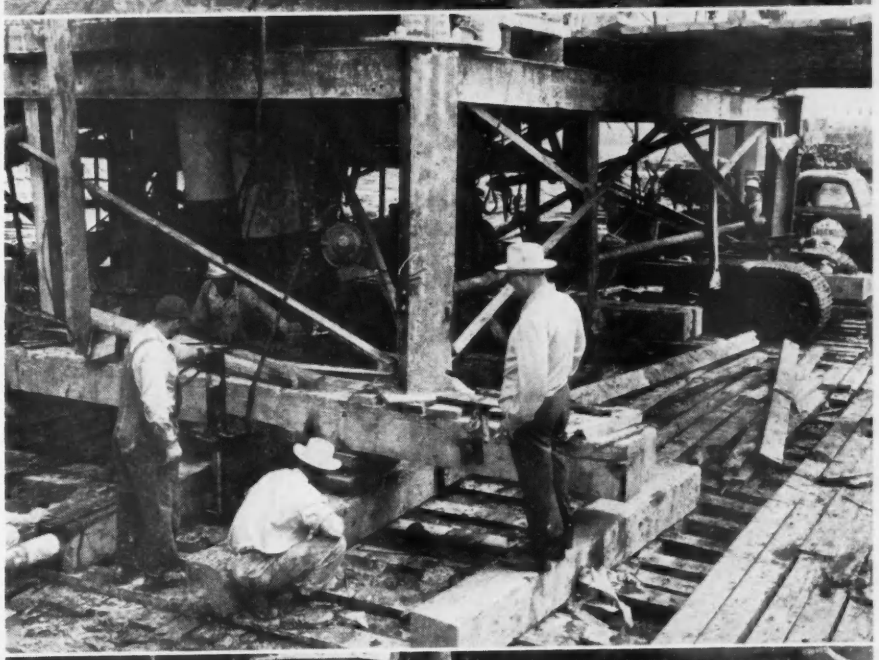
★

TOP RIGHT: Small compressor motors and pressure hose on hydraulic-jack truck. Initial step taken is to jack up derrick to permit double-track dollies in upper left to back under the main derrick sill. Each jack has a maximum 18-inch lift and a 50-ton capacity.

equipment is 112 tons. Each dolly has a rated capacity of 30 tons with a safety factor of 7 to 1 at five miles per hour. The combined weight of the four dollies is 25 tons. Because of the bearing surface of the tracks, this total load of 137 tons did not make the tracks sink more than two inches in the soft ground and two crawler tractors pulled the load with ease. The unit arrived at the new location before all the derrick sills could be moved by trucks.

The flexibility of the dollies is remarkable. Each dolly supports its load in a swivel saddle which permits vertical and horizontal movement of the tracks necessary to traverse uneven ground or jockey the derrick into its proper position on the location. No special substructure is necessary on a derrick to use the dollies and they accommodate any size base including jackknife derricks. The dollies are quite adaptable to moving other large and heavy equipment with a saving in time and preparation.

The moving of derricks in this manner is limited by natural and man-made obstacles, but for short distances the method has many desirable features.



CENTER: McCarthy Oil and Gas Corporation derrick with seven-foot substructure prepares for a move in the Big Hill field, 13 miles southeast of Winnie, Texas. Derrick corner is at top of lift with sills ready to be pulled out.

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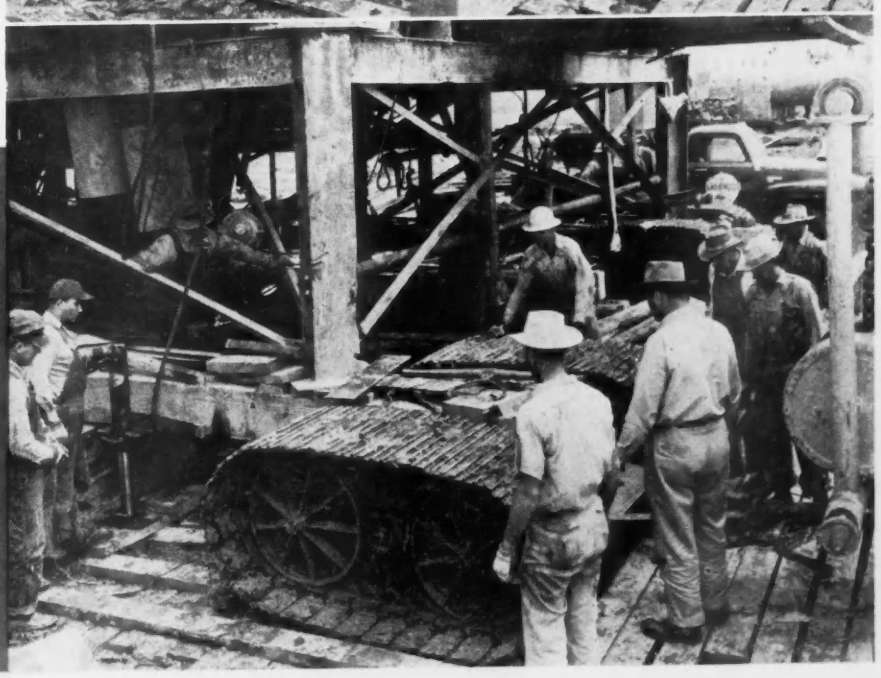
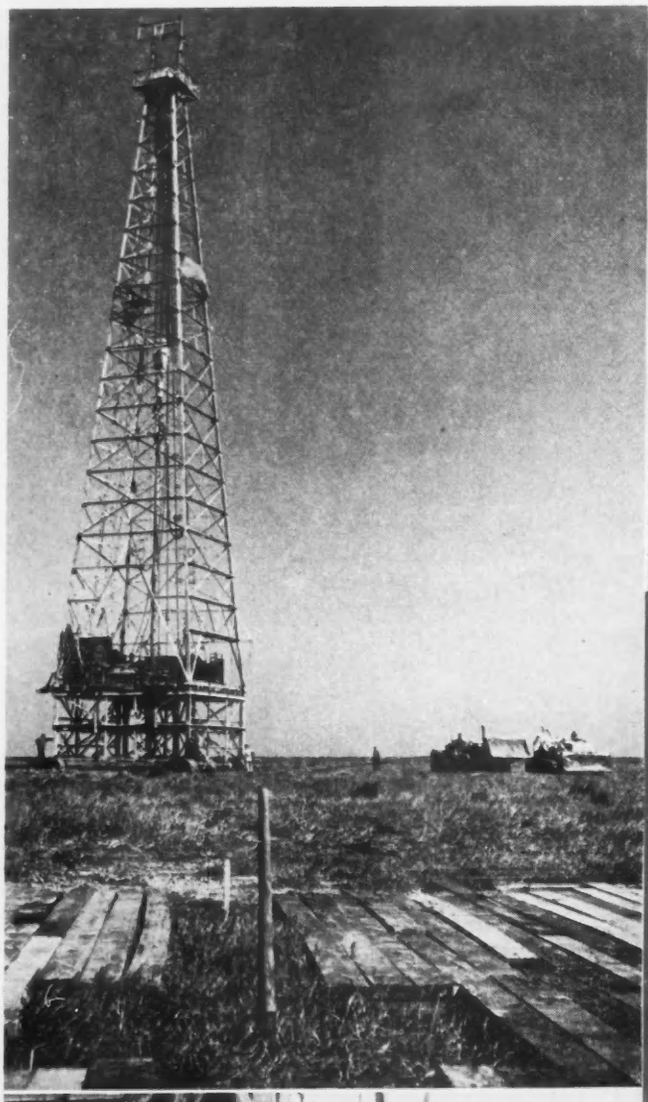
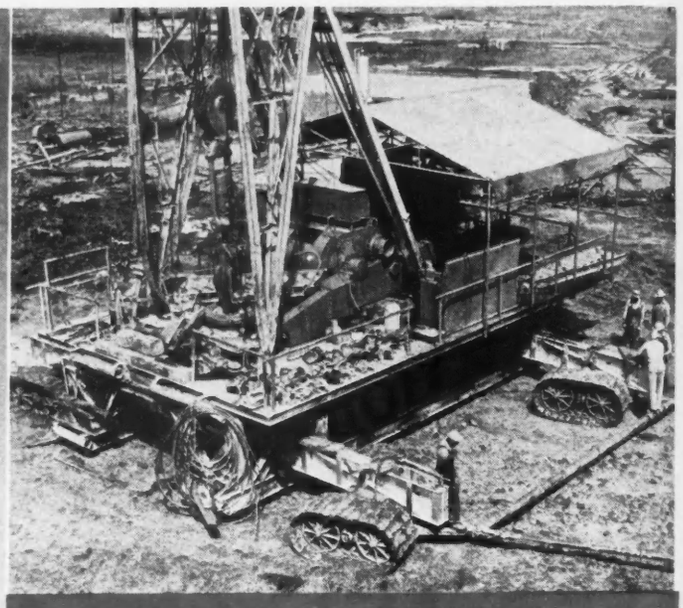
BELOW: Dolly being backed under raised corner of the McCarthy derrick. Dollies have mud-boats constructed between the tracks in the event the ground is too soft. Note drill pipe brace across substructure.



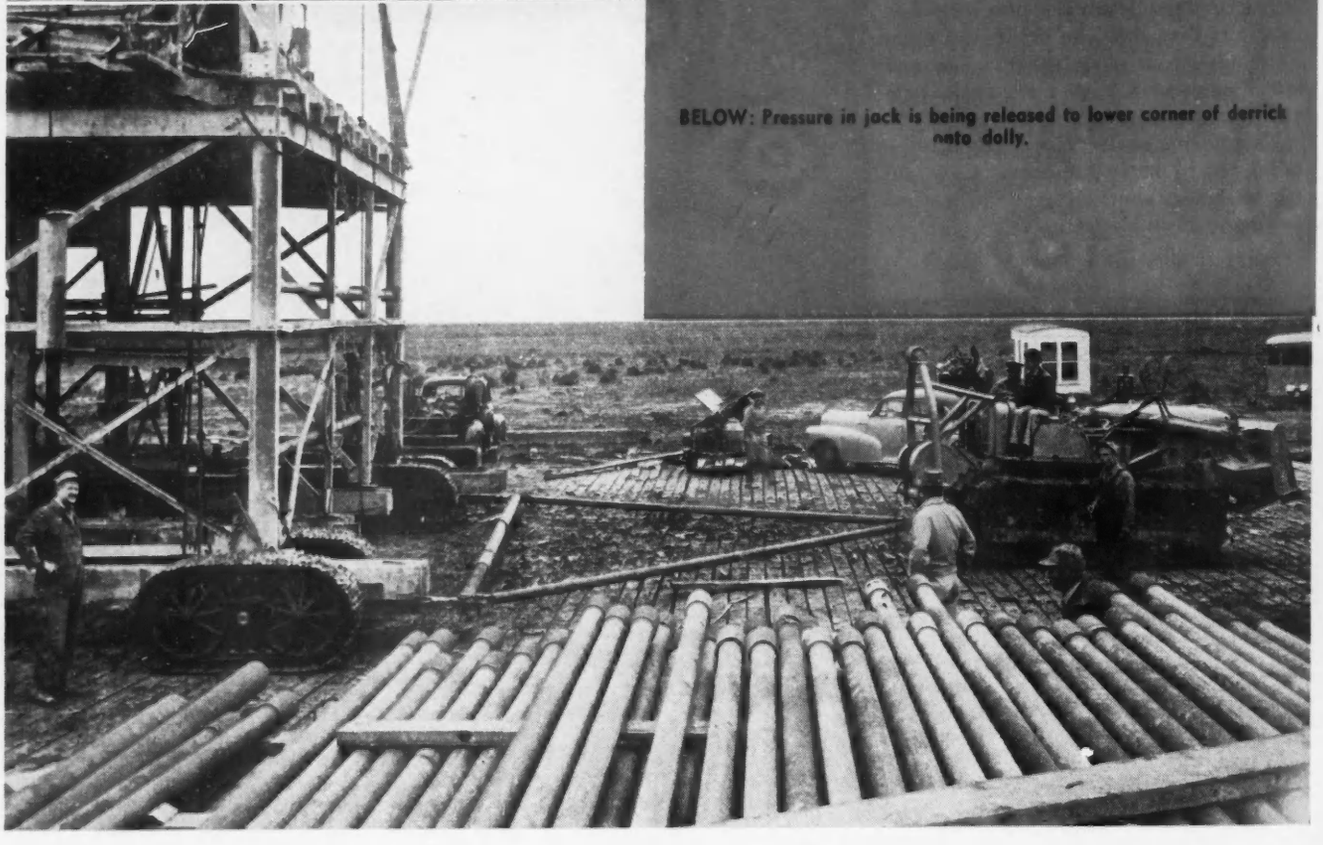


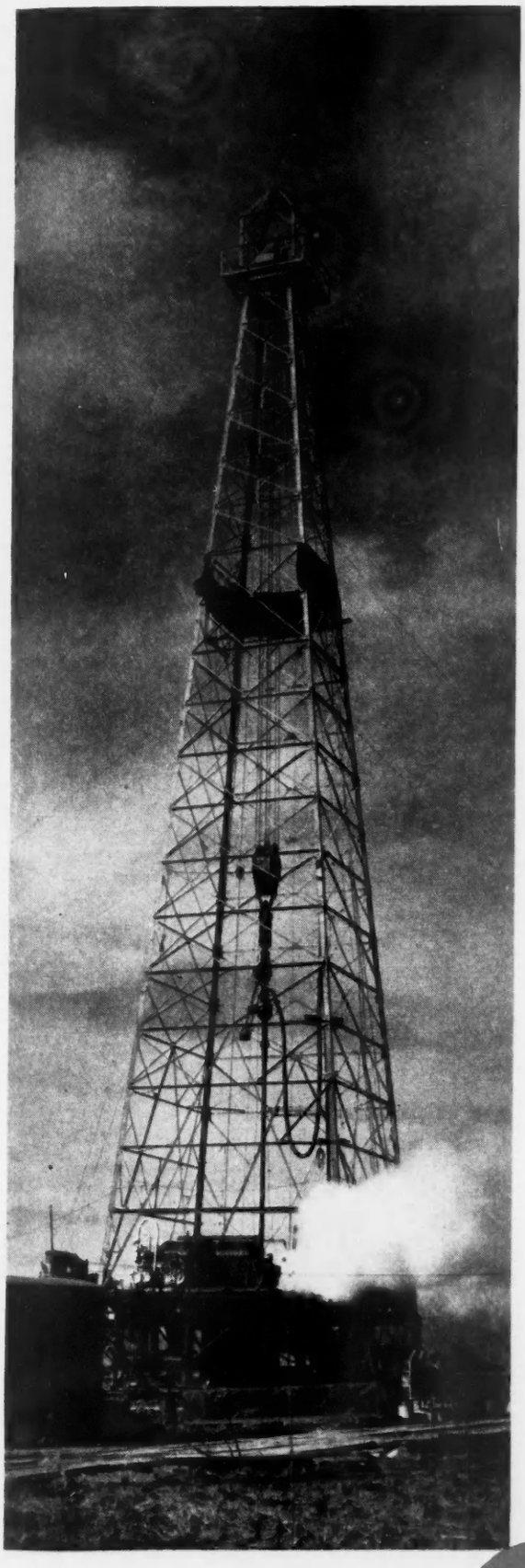


ABOVE: Jack-knife derrick and motors being moved as one unit. Turnability of dollies is apparent here.

LEFT: Derrick approaching new location marked by upright peavy hook. Board platform was put down the day before.

BELOW: Pressure in jack is being released to lower corner of derrick onto dolly.





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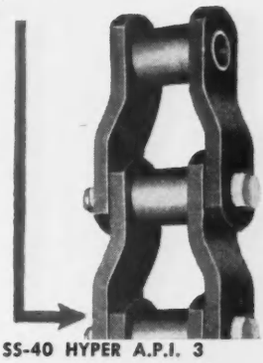

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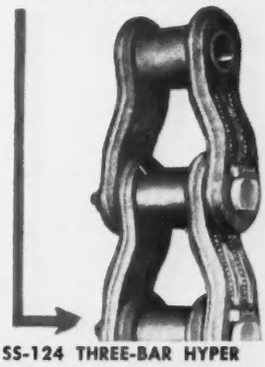

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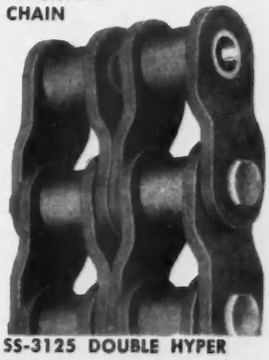

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CHAINS AND SPROCKETS

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Jacket-Type Piling Structures

Speed Marsh Drilling

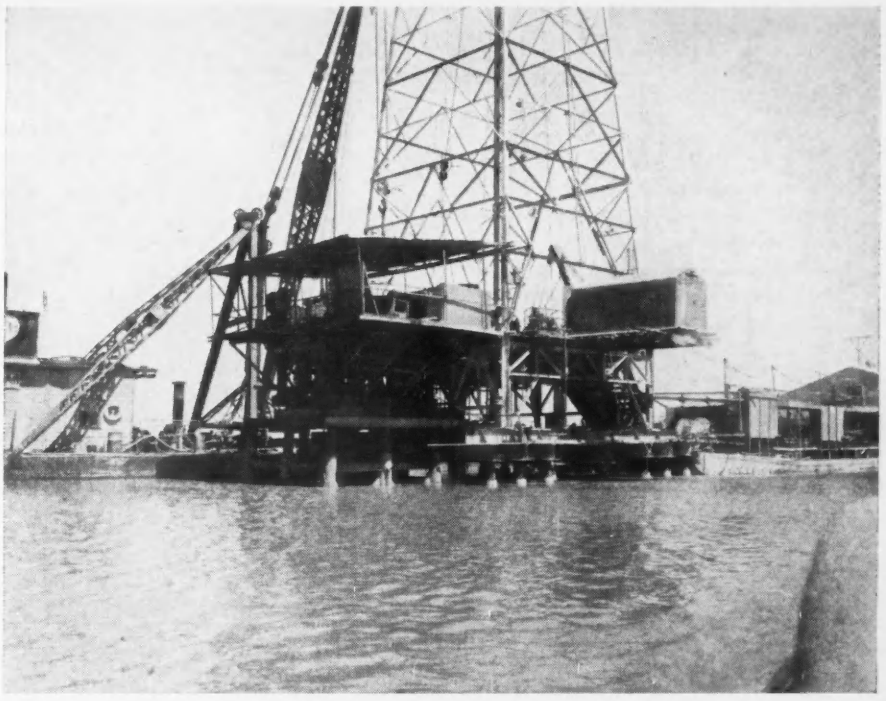
By J. E. KASTROP
Gulf Coast District Editor

A typical steam rig location at Pointe a la Hache. The derrick and engine are mounted on the jacket-type piling structure, while the remainder of the rig, including pipe racks, shale shakers, mud pumps, mud pits, fuel and water tanks, and boilers is placed on a floating barge 230 feet long.

A NEW drilling practice unique in swamp or marsh operations is bringing substantial savings by speeding field development in addition to contributing to record-breaking drilling time. This technique had its origin in the offshore structures in deep water of the Gulf of Mexico where large templates guide steel casing piles into the muddy bottom. Designed and constructed by J. Ray McDermott & Company of Harvey, La., these jacket-type piling structures make it a relatively simple matter to convert a land rig, both steam and power, for marsh operations.

It's a long way from the wind-swept sandy plains of West Texas to the water-soaked marsh lands of Coastal Louisiana, but four heavy-duty rotary drilling rigs made the move with remarkable results. Richardson & Bass of Fort Worth, transferred three steam rigs and one power rig to complete its drilling program in the company's Pointe a la Hache field one mile east of the Mississippi River in Plaquemines Parish.

With a backlog of experience in drilling the hard dolomites and limestones of the Permian Basin, these rigs and their crews are currently drilling 11,000-foot wells in record-breaking time. It is not unusual for these rigs to attain a depth of 10,000 feet in 13 to 16 days. The average for 29 wells drilled is less than 25 days. One oil well was completed recently to a total depth of 11,247 feet in just 21 days after it was spudded. So far, this well holds the record. The average completion time for the 29 wells, including directional holes, is about 50 days, with the deepest well having a total depth of 12,500 feet.



Large crane barge transferring rotary and rotary drive unit from floating barge to derrick floor. Boilers are moved with full steam pressure to be ready for operation upon connecting the steam lines to the engine.

DEVELOPMENT OF equipment for coping with the special problems imposed by water operations continues to cut the time required for "web-foot" drilling, latest improvements looking toward reducing the down time for rig shifts. This article describes an adaptation of the template method which utilizes prefabricated assemblies for guiding the foundation piles and continues to use them as structural bracing during drilling of the well. Material savings in time over wooden piling structures are shown, and the template construction is 100 percent salvageable.

Old vs. New

During the early development of the field, timber piling structures were used, the salvage of which was about 75 percent on each location. Although the initial cost of the jacket-type platform was several times greater than the wooden structure, there are many important factors which have brought about unusual economies in the development program of the field by this new technique.

The speed with which these jacket-type piling structures can be erected or disassembled is one of their outstanding features, plus the fact that they are 100 percent salvageable. The additional stiffness and cross-bracing offered by the jackets provides a platform that is exceptionally rigid for a piling structure in the soggy marshes. Reinforcement of the jackets below the water line accounts for this rigidity, whereas, it was not practical to add cross bracing to the wooden piling structures below the water line.

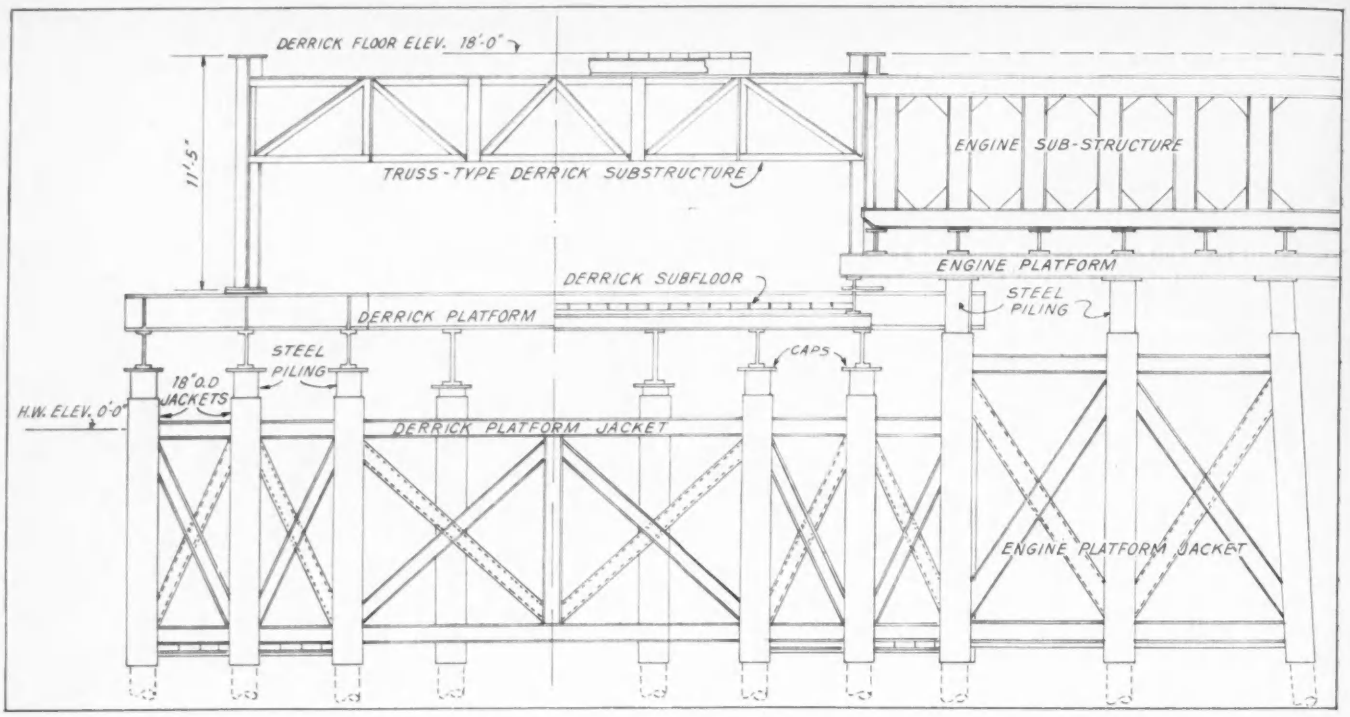
Four Platform Parts

A typical jacket-type piling platform is made up of only four basic parts: (1) the derrick platform jacket; (2) the derrick platform; (3) the engine platform jacket; and (4) the engine platform. The derrick substructure and derrick rest immediately on top of the derrick platform, while the engine and engine substructure are mounted on the engine platform.

The derrick platform jacket consists of 28 templates or jackets of 18-inch outside diameter pipe, approximately 14 feet long. Clusters of six jackets spaced on five-foot centers are located at the derrick corners, with two intermediate jackets placed between each corner cluster on the outboard sides of the derricks, making a total of 28 jackets for the main integral unit of the platform. The 18-inch templates or jackets are tied together in a horizontal plane at top and bottom by ten-inch H-beams. Angular bracing is provided by 12-inch H-beams, as shown in the construction yard illustration. A prefabricated rathole for the kelly is made of 14-inch casing welded into the derrick platform jacket at the proper angle, thereby eliminating time required in making the rathole setting before starting the well.

The derrick platform, measuring 42 by 37 feet, was fabricated from heavy, galvanized H-beams. Two 33-inch H-beams span the platform on either side of the well and rest on the four intermediate piles to provide support for ten-inch H-beams which serve as floor sills. A three-inch wooden decking is laid over these sills to completely cover the derrick sub-floor which is a few feet above the water line. Outside borders of the derrick platform are of 21-inch, 62-pound H-beams which serve as tie-in members.

The engine platform jacket is similar in design and construction to the cor-



Structural details of complete platform.

ner clusters of the derrick platform jackets. It consists of nine sections of 18-inch O.D. pipe 16 feet long, welded and cross-braced with 10 and 12-inch H-beams. The jackets are spaced on eight-foot centers, with over-all dimensions from center to center of the piles at the top of the structure measuring 16 feet wide by 16 feet long. The rear jackets are set at a slight angle so that the distance at the lower end of the structure measuring from the middle pile to the end pile is nine feet, against the eight feet at the top, giving a spread of one foot at the bottom.

The engine platform is 22 feet, 5 inches in over-all length by 17 feet, 6 inches in width, and is made of 14-inch, 73-pound H-beams. Piling bearing plates are bolted to the lower flange of runner beams which span the engine platform piles. When mounted on piles cut to the proper height, one end of the engine platform rests on the derrick platform as shown in the drawing.

The four component parts making up the prefabricated piling structure have a total weight of about 157,729 pounds. Their individual weights are as follows:

Derrick platform jacket	72,000 pounds
Derrick platform	42,400 pounds
Engine platform jacket	27,794 pounds
Engine platform	15,535 pounds
Total weight	157,729 pounds

Types of Piling

Two types of steel piling have been used on these prefabricated structures: 12-inch by 12-inch, 53-pound H-beam piles; and 14-inch O.D. casing. In each case, the prefabricated structure is the same in design and construction, differing only in guide tabs welded inside the jackets for the H-beam piling. Pipe piles are welded joint by joint until a total length of approximately 80 feet is obtained. Two 40-foot lengths of H-beam are spliced by welding ribs on either side of the web to span the junction. In the case of the H-beam piles, total weight of 37 such piles is about 156,880 pounds, the heaviest item in the structure.

Derrick Substructure

The derrick substructure is a standard truss-type member supported on four legs that rest in the center of each corner pile cluster. The truss-type construction permits full opening below the derrick floor where, in some locations, the rotary drive engine has been mounted. On other rigs, the rotary is direct-driven by a separate floor drive, or by a chain drive from the drawworks. The derrick sub-floor provides easy access to the blowout preventers and well head during drilling and completion operations. Four 12-inch H-beam supports were added beneath the rotary to provide additional strength on deep wells where long strings of 9⅝-inch casing are set. These legs rested on the 33-inch H-beams spanning the derrick platform.

Compared to lining up and driving timber piling, erecting the prefabricated jacket structure is elementary. The main unit, the derrick platform jacket, barged to the location, and by means of a large crane barge is lifted and properly oriented at the well site.

The engine platform jacket is then set in proper relation to the derrick platform jacket. Steel H-beam piles or casing piles 80 feet long are then placed in the jackets and driven down until they extend slightly above the jacket which guides them into the marshy bottom. They are then cut off to the proper height and a steel pile cap plate welded to them.

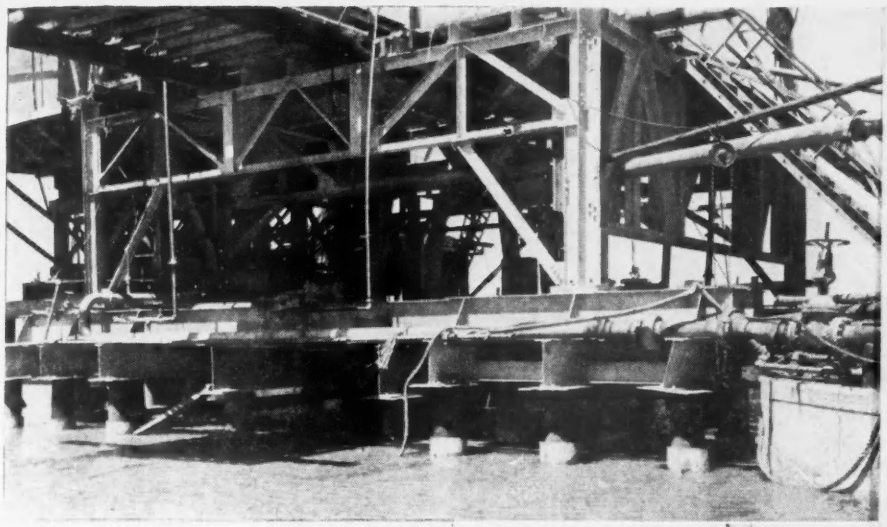
The derrick platform is then set in place by the barge crane and bolted to the cap plates on the piles. Bolts pierce the lower flange of the H-beams to hold the platform securely in place. The engine platform is mounted on the engine piling in the same manner.

Prefabricated derrick and engine substructures are bolted to the platform in their respective positions. The derrick is then erected and the rig moved on the structure with the aid of the crane barge used in the assembly of the platform. Once in place, the structure offers a substantial foundation for the heavy-duty drilling rigs.

Since the pipe racks, mud pumps, mud pits, mud house, office, change rooms, boiler house and fuel tanks are placed on one barge 230 feet long by 45 feet wide, it is necessary only to connect up the steam, water and mud lines to the barge and to have the rig ready for drilling.

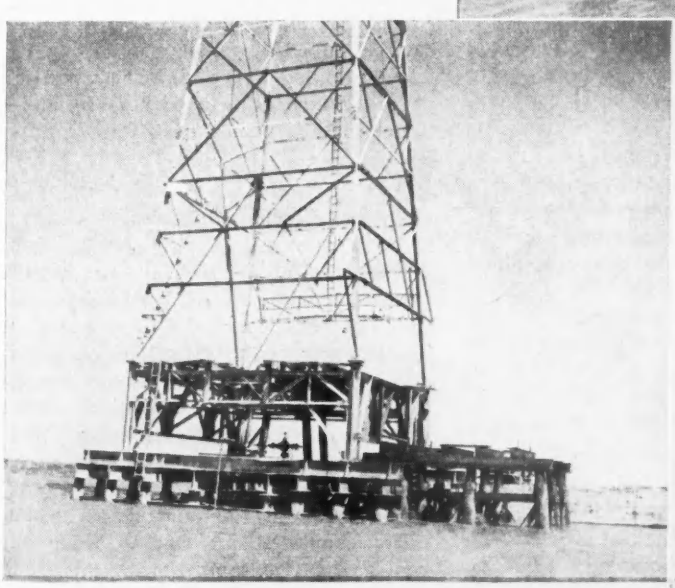
Moving the Jacket Structure

Moving the rig and jacket structure is performed in the reverse order as

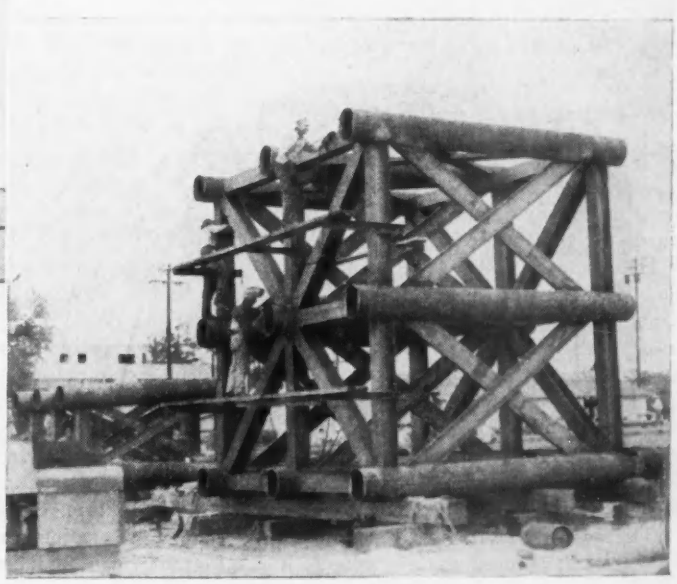


Closeup of derrick platform jacket and platform with substructure in position. Pipe piles were used on this location rather than steel H-beam piles. Note the truss-type substructure which provides wide clearances below the derrick floor.

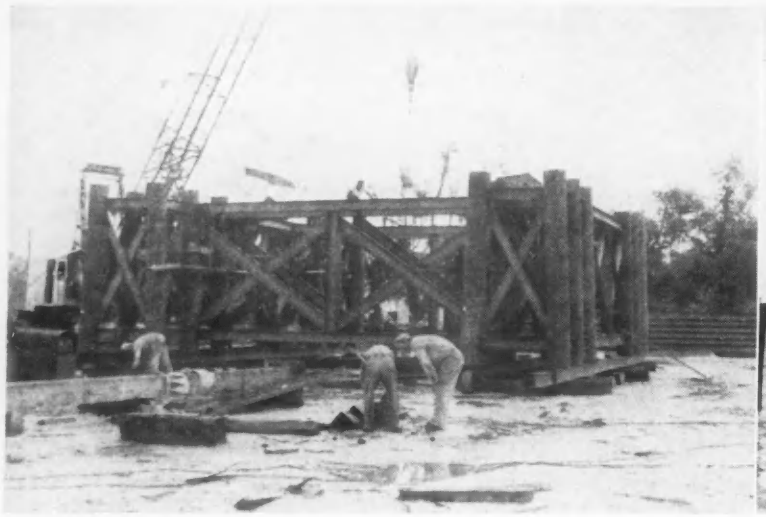
Relative heights of the engine platform in foreground and derrick substructure in background as well as method of tying derrick platform to engine platform are shown in this view.



Derrick and platform have been stripped of all drilling equipment, leaving only a completed well, indicated by the tree below the derrick floor. The derrick will be dismantled down to the vee and the remaining structure moved in five separate pieces.



Engine platform jacket under construction. This view illustrates the heavy H-beam cross-bracing below the water line.



LEFT: The derrick platform jacket, main element of the structure, being fabricated in the J. Ray McDermott & Company yards at Harvey, La. Illustrated here are the corner jacket clusters and the method of cross-bracing.

RIGHT: A forest of wooden piling being pulled from an old location. This salvage job requires several days more work than the job of removing the jacket-type structure. Wooden piling structures are only about 75 percent salvageable compared to 100 percent salvage of the jacket structures.

previously described for setting up the rig. With the aid of the crane barge, heavy units of the rig are transferred to a floating barge. These heavy items include the drawworks, steam engine, rotary and rotary drive, crown block, traveling block, swivel and kelly.

Once the derrick is stripped of drilling equipment, it is dismantled down to the V. The remainder of the derrick along with the truss-type substructure is removed in one piece to the transfer barge. Both derrick and engine platforms are them unbolted from the piling caps and loaded, leaving only the piling and jackets. The steel piles are pulled by the crane and placed on one barge since they constitute the heaviest single item. With the piling removed, the two jackets are then lifted and loaded for transfer to the next location. Since the jackets carry no vertical load other than their own weight, they are easily pulled from the canals which are dredged for the location.

Current Field Practice

While there are five rotary rigs running in the field, one is a large steam barge rig that made its debut at Pointe a la Hache in 1948. It is suitable for and occasionally used for workovers. One of the land rigs, a power unit, uses identical jackets furnished the steam rigs, with the exception that two engine jackets are required to support the engines and one mud pump. Derrick design is identical. Since pipe racks are not included on the floating barge, they had to be placed on wooden piling.

The barge containing mud pits, auxiliary mud pumps, shale shakers, fuel and water tanks was tied up to the rear of the engine platform, and the pipe racks were added on the opposite side of the derrick facing the V.

The location layout for each steam rig is identical and any one of the land rigs can be used on any jacket platform designed for a steam rig. Basically, the steam rig platform and the power rig platform are the same, differing only in the number of engine and pump platforms.

Five complete sets of jacket-type platforms, substructures and derricks were made for the Pointe a la Hache field development project. The extra platform and derrick made it possible to erect one structure in advance of drilling so that when one well was completed, the rig could be moved in a minimum of lapsed time and spudded without standing idle until the platform could be moved and erected. In this manner, maximum use was made of the tugs and crane barge used to pull the steel piling and perform the heavy lifting in moving the structure and the rig.

This field practice of maintaining an extra set of jackets and platforms so that a location is ready for the first available rig has enabled Richardson & Bass to move a complete steam rig in half a day, set it up on the next location in another half day, making the full rig move in approximately 24 hours. Such moving time would be unusual even for medium-depth land rigs.

Experience has shown that an average of 14 days is required to salvage a timber piling structure and re-erect it at a new location. Once the rig is moved from the location, the jacket-type drilling platform including the derrick can be completely removed and set up at a new location ready to receive the next rig in from three to four days.

By reducing the time required to drill each well by eight or nine days, due only to the difference in platform design and construction, it has been estimated that the jacket-type piling structures will pay for themselves in a little more than four location moves. By supporting the heavy rig on a more rigid foundation, the long strings of drill pipe can be pulled at faster speeds due to less vibration. This additional speed in making round trips accounts for additional saving in time over former procedures.

Drilling Progress

Drilling deep oil wells in the soggy marsh lands has always been an expensive operation, exceeded in cost only by the later offshore exploration projects. The water barrier has accounted for the large cost, since floating equipment is mandatory. By utilizing these salvageable jacket-type piling structures, the large investment in a barge rig was eliminated, and the land rigs can be easily converted for drilling wells on land again. A rig move with this new technique can be made in about the same time it requires a large steam barge rig to make a location move.

Radical departures from tried and proven methods are bringing about results in regions where it is costly and difficult to drill. Alert management working jointly with skilled engineers have made a big step ahead in field development drilling of marsh areas.

Factors Affecting Penetration Rate of Rock Bits

Part 2

By W. J. BIELSTEIN and GEORGE E. CANNON
Humble Oil & Refining Company

TESTS to determine the effect of nozzle-fluid velocity on rate of penetration of two-cutting element jet rock bits were run in soft and medium-hard formations. Typical test results are presented in Figure 16. As may be noted, the trend established is that the rate of penetration increases as the nozzle-fluid velocity is increased; however, this rate of increase in rate of penetration with increased nozzle-fluid velocity has been somewhat erratic, based on actual test results. In drilling the Taylor shale between 2900 and 3600 feet in the Pickton and Yantis fields, Texas, the penetration rate was increased 53 percent and 44 percent on two series of tests when the nozzle-fluid velocity was increased 143 and 156 percent, respectively. These percentage increases are based on basic nozzle-fluid velocities of less than 150 feet per second. At nozzle-fluid velocities of less than 150 feet per second, the usual experience was that the penetration rates of jet rock bits fell below the penetration rates of conventional rock bits, and any change below this basic nozzle-fluid velocity resulted in little change, if any, in the penetration rate. At some nozzle-fluid velocity between 150 and 200 feet per second, a sharp increase in drilling rate generally resulted, with the rate of increase in penetration rate from this point on decreasing as the nozzle-fluid velocity increased.

In medium hard formations, i.e., the Austin chalk formation in the Jourdanton field, Texas, from 6480 to 6600 feet, a 50 percent increase in rate of penetration was effected by increasing the nozzle-fluid velocity 158 percent; however, this percentage increase is based on a low nozzle-fluid velocity of 95 feet per second and a high nozzle-fluid velocity of 245 feet per second. Intermediate increases of 18 and 28 percent for respective increases in nozzle-fluid velocities of 79 and 44 percent were obtained. Within the limits of the nozzle-fluid velocities used, the results in medium-hard formations were similar to those in soft formations, in that at low nozzle-fluid velocities little change in drilling rate was effected.

Based on the rate of increase in penetration for nozzle-fluid velocities between 170 and 245 feet per second and on performance of the conventional bit, it appears that a basic nozzle-fluid velocity greater than 200 feet per second is required to effect a significant increase in drilling rate.

Penetration Rate

Evaluation of the circulation rate and nozzle-fluid velocity from the standpoint of nozzle power factor, which is the product of the two, indicates that a definite increase in the rate of penetration accompanies an increase in nozzle power factor. Figures 17 and 18 present graphically the data on relation of nozzle power factor to rate of penetration of jet rock bits in soft and medium-hard formations. As based on data presented in Figures 15 and 16, the trend in the drilling rate is the same for the nozzle power factor as that established for nozzle-fluid velocity in soft formations. Based on minimum nozzle-fluid velocities of less than 150 feet per second and maximum nozzle-fluid velocities varying from 306 to 323 feet per second, the ratio of the percent increase in nozzle power factor to the increase in rate of penetration was approximately 3:1; whereas, at intermediate values for nozzle-fluid velocity, the ratio of the two percentage increases was approximately 2:1. At higher basic values for the nozzle-fluid velocity the ratio of the percentage increase in nozzle power factor to percentage increase in drilling rate was from 4:1 to 6:1. In some instances, these latter ratios were less; however, more often than not the ratios were higher.

In medium-hard formations, the drilling rates at nozzle-fluid velocities of 200 feet per second or less were erratic, even with substantial increases in the nozzle power factor. On the two series of tests, the only tentative trend established was that an increase in penetration rate can be expected when the nozzle power factor is increased and the nozzle-fluid velocity is greater than 200 feet per second.

An investigation to determine the relationship of nozzle power factor to rate of penetration of three-cutting element jet rock bits revealed that the latter is a function of the nozzle power factor; however, the rate of increase in penetration rate with increased nozzle power factor was not established. Figure 19 presents graphically test results run in the Pickton field, Texas, between 3230 and 3385 feet. In the first series of tests, the nozzle power factor was increased 102 percent and the drilling rate increased 37 percent. In the second series of tests, slightly harder formations were drilled and a 236 percent increase in nozzle power factor resulted in a 30 percent increase in drilling rate. The basic nozzle power factor in the latter tests was much lower than in the first. Disregarding the lowest value of the nozzle power factor obtained on the second series of tests, the penetration

rate was increased 24 percent when the nozzle power factor was increased 89 percent. In addition to establishing this relationship between nozzle power factor and rate of penetration of three-cutting element jet rock bits, the tests also indicated that a higher basic nozzle-fluid velocity is required to effect an appreciable increase in penetration rate with three-cutting element jet rock bits than with two-cutting element jet rock bits, as the sharp increase in the rate of penetration occurred only after the nozzle-fluid velocity had increased to 267 feet per second. The latter is only a tentative observation, as the same bit was used and both nozzle-fluid velocity and circulating rate were changed to effect a change in the nozzle power factor.

An analysis of the data on the hydraulic factors affecting the rate of penetration indicates that the penetration rates of rock bits are improved by directing the fluid to the bottom of the hole and by maintaining high nozzle-fluid velocities and circulation rates. It is also apparent that the type formation being drilled will necessarily govern the minimum nozzle-fluid velocity required to effect an appreciable increase in penetration rate. It may be anticipated that, as the hardness of the formation increases, the advantages derived from high nozzle-fluid velocities will diminish until the major factor contributing to increasing the penetration rate will be the cleaning action of the fluid directed to the bottom of the hole, which eliminates regrinding of cuttings. To date, these anticipated results have not been proved and field application of the jet-type rock bits has been limited principally because of the problem of bit supply. The use of three-cutting element rock bits to drill formations to 8000 feet in the Pickton field, East Texas area, and to 4400 feet in the Bronte field, West Texas area, has resulted in appreciable savings in drilling time and bits. Drilling data on wells using conventional and jet rock bits are presented in Table 1. In the East Texas area, the drilling time on the fastest well drilled with jet rock bits was approximately 28 percent less than the best drilling time on conventionally drilled wells and 14 percent less than the time on the one well drilled using conventional bits and series operation of slush pumps. In addition, ten less jet rock bits were used in drilling comparable amounts of footage. In the West Texas area, an 8¾-inch hole was drilled using jet rock bits having three cutting elements. The only comparative data available on conventionally drilled wells were wells drilled using 6¾-inch bits. The 8¾-inch hole was drilled 15 percent faster than the 6¾-inch hole, and four less bits were used. Because of the limited horsepower available to run the pumps, the redistribution of the fluid at the bit was the primary reason for the increased rate of penetration, as the maximum nozzle-fluid velocity used was only 243 feet per second, with the average being approximately 190 feet per second.

Nozzle Power Factor

The magnitude of the nozzle power factor depends principally upon the hydraulic horsepower available, the depth at which operations are being carried out, and the efficiency of the nozzle. Field tests of bits have indicated that bit-nozzle coefficients have varied from approximately 0.80 to 0.92. The higher coefficients were for nozzles of more recent design than those used on initial investigations of the hydraulic factors affecting the rate of penetration of rotary bits. Some designs of nozzles had high nozzle efficiencies at low rates of flow; however, at high rates of flow, the nozzle coefficient dropped as much as 7 percent. Recent laboratory tests of nozzles having various lengths and entrance and exit designs revealed that a nozzle having an entrance profile on the order of a long ellipse and a sharp exit, as illustrated in Figure 20, provided a nozzle coefficient of approximately 0.99. Utilization of more efficient nozzles in jet rock bits will make available additional horsepower for increasing the rate penetration. For example, a change in the nozzle coefficient from 0.8 to 0.9857 will reduce the pressure drop and horse-

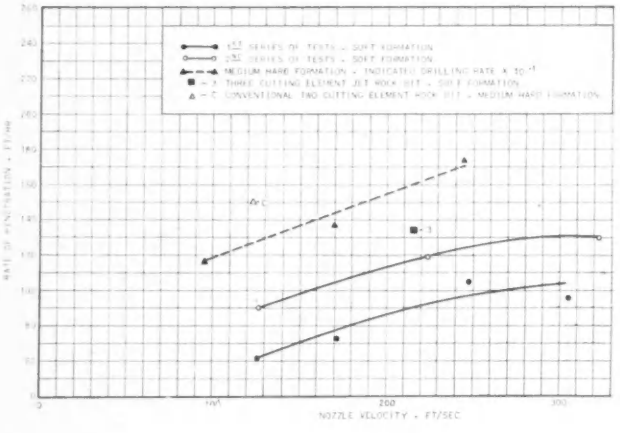
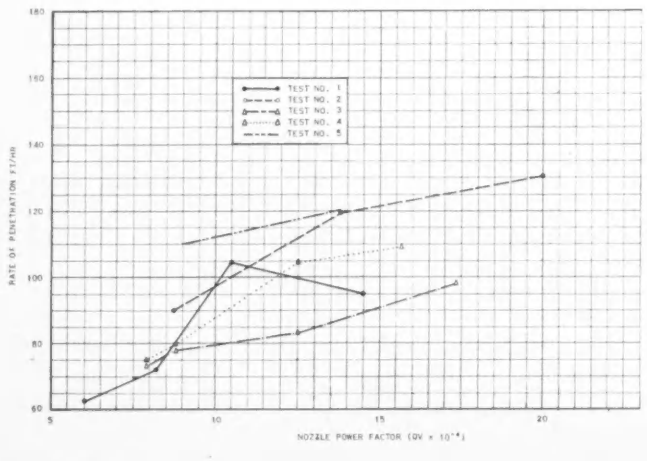
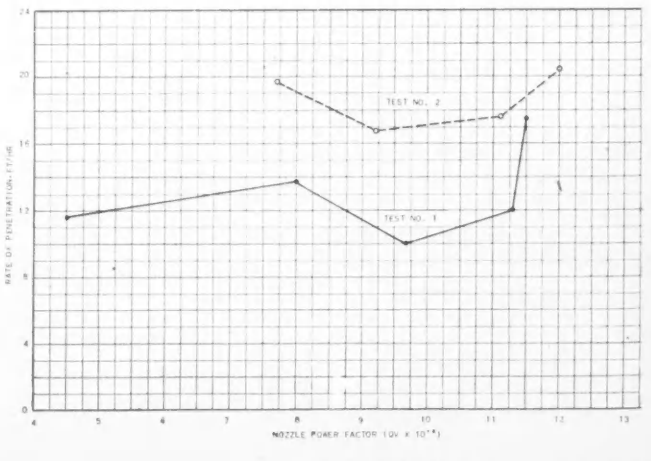


FIGURE 16 (top left). Relation of nozzle fluid velocity to rate of penetration using two-cutting element jet rock bits at constant rotary speed bit weight and circulation rate.

FIGURE 17 (lower left). Relation of nozzle power factor to rate of penetration of two-cutting element jet rock bits in soft formation.

FIGURE 18 (lower right). Relation of nozzle power factor to rate of penetration of two-cutting element jet rock bits in medium hard formation.





Front Page News: PERFORATING GUNS ATLAS CORPORATION does it again!

1947 – Developed ATLAS BULLET GUN – still the world's most powerful bullet perforating gun.

1948 – Pioneered in perfecting JET GUN PERFORATING and its acceptance in the oil fields.

1949 – Developed NEW GAMMA RAY INSTRUMENTS for quantitative and more precise well logging.

1950 – See FRONT PAGE STORY below from Houston Post of February 20, 1950.

Page 16, Column 3

See LOGGING PROCESS Page 4, Column 2

Atomic Radiations Employed in Process

New Oil Well Logging Method Developed

Perforating Guns Atlas Corporation, a Houston oil field service firm, has developed a new well logging method using one of the radiations that also occurs in atomic piles, Paul Charrin, president of the company, announced Sunday.

"OUR RECENT development consists of a neutron log in which an entirely new radiation is recorded," he said. "This radiation is known as thermal neutrons, the same as produced in atomic piles operated by the Atomic Energy Commission."

A new method of logging oil well formations with this radiation was first originated in 1940 by F. Brons. But it took many years to put his invention to practical use. Geologists, geophysicists, physicists and other scientists have long pursued the elusive goal of simultaneously recording natural gamma rays and this "Brons-neutron" curve, Mr Charrin said.

This has now been achieved by the Perforating Guns Atlas Corporation, Mr Charrin said. He explained that radiation logging has been used in the oil fields for many years, mostly to log formations lying behind casings in oil wells.

"In the past, two techniques have been used. One is known as gamma ray logging, in which the natural radioactivity of the formations is measured," he explained. "The other technique is known as neutron logging, in which the formations are bombarded by artificially produced neutrons.

"SOMETIMES ONLY one of these two logs is run. But to solve a great many oil production problems, both logging techniques are required. And, heretofore, these instances have required running one log after the other.

"Radiation logging has always required relatively slow movement of the logging instrument in the well. Consequently, each one of the two logging techniques has consumed hours of costly rig down-time."

"With the new process," Mr Charrin said, "we can now cut rig time in half by simultaneously recording the two radiation logs. Operators can now save from five to 10 hours on each logging. And with rig time costing from $25 to $50 per hour, this means substantial savings for operators through the use of our new development."

During the past year, the Perforating Guns Atlas Corporation has retained Serge Scherbatskoy, prominent consulting engineer of Tulsa. He has directed much of the company's research work which resulted in this new scientific development.

And about the new method, Mr Scherbatskoy said, "the interpretation of a neutron log usually requires its comparison with the gamma ray or radio-

Logging Process Will Be Offered in Oil Fields

(Continued from Page 1)

activity log of the same well. Usually, the two logs are mirror images of one another in all zones except those reflecting high porosity or gas content.

"NOW, INTERPRETATION requires an accurate and continuous juxtaposition of the two logs. And this is where, heretofore, our troubles always occurred—for even minute deviations in depth measurements in either one of the logs can be extremely important. Henceforth, any possibility of interpretation errors from this source is completely eliminated, due to this new simultaneous log perfected by the Perforating Guns Atlas Corporation."

Mr Charrin went on to explain, "We use a new, extremely intense neutron source, utilizing artificial radio-isotopes the same as produced in the atomic pile. So you see, even our oil fields now benefit by science's atomic energy!

"For the neutron side of our log we had to develop entirely new radiation counters with very high response to slow neutrons.

"Utilization of the new source, together with our special radiation counters and newly perfected electronic circuits, permit our production of the two logs simultaneously — and without any interference between them. Thus we remove any possibility of interpretative error from a source that has long defied science."

MR CHARRIN said the new logging process has been tested on many surveys and it will soon be offered as a service in the oil fields.

This company's engineers have contributed many new developments to the oil field industry. In 1947, they developed the Atlas gun—the first new oil field bullet gun development in more than 10 years, and still the world's most powerful bullet perforator.

In 1948, Perforating Guns pioneered in the perfection of jet perforating, and secured wide acceptance by operators in the mid-continent area for their industrial version of the famous "Bazooka" of World War II.

The company has its executive offices and plant in Houston. It maintains 12 branch offices throughout the oil country, and also has a Canadian affiliate company.

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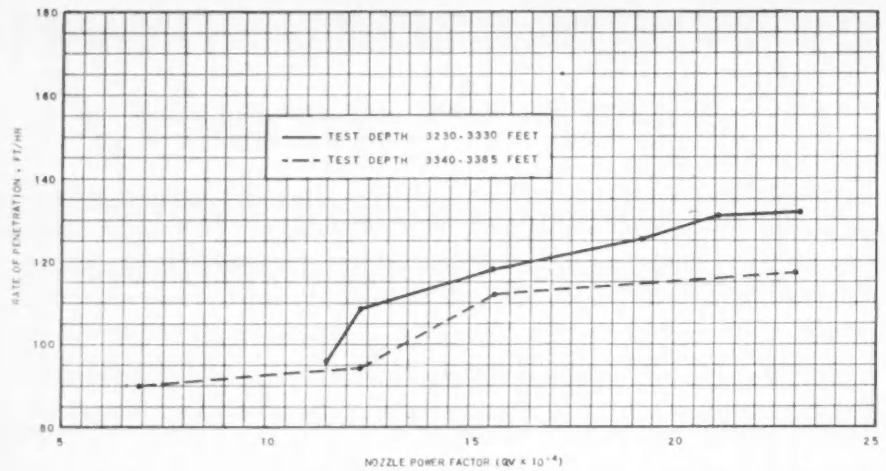

FIGURE 19. Relation of nozzle power factor to rate of penetration of three-cutting element jet rock bits in soft formations.

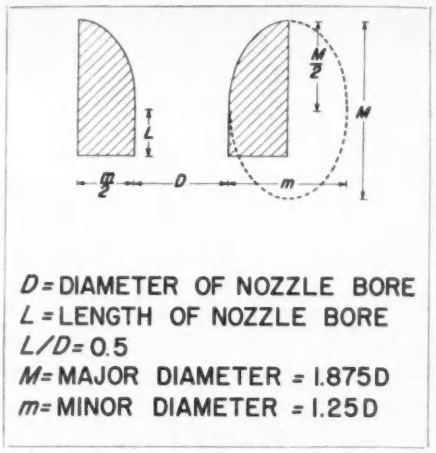

FIGURE 20. Cross-section of profile of nozzle with elliptical approach and 0.986 discharge coefficient.

power loss at the nozzle by approximately 35 percent.

ROTARY SPEED: Limited tests have been run on two-cutting element jet rock bits to determine the relation between rotary speed and drilling rate. These tests were conducted while drilling the Taylor shale in the Pickton field between 3100 and 3350 feet. Results of the tests are graphically illustrated in Figure 21. An analysis of the data reveals that the rate of penetration increases as the rotary speed is increased and changes at a rate of approximately 1:2. This relationship, as established, may be limited to high-drillability formations and to bits having two cutting elements. Additional investigations will be required to evaluate rotary speeds on various bit designs and types of formations.

BIT WEIGHT: Controlled tests to determine the relation of bit weight to drilling rate were conducted on various bit designs in soft and medium-hard formations. Evaluation of bit weight was made for soft formations and two-cutting element jet rock bits while drilling the Taylor shale section between 3100 and 3550 feet. Results of tests are presented in Figure 22. Analysis of the data reveals that the rate of penetration is directly proportional to the bit weight. On the basis of the actual results, some variation from the directly proportional relationship exists; however, the relationship as stated occurs more often than not. For two-cutting element jet rock bits in medium-hard formations, limited tests indicate that the directly proportional relationship established for soft formations also exists. For two-cutting element conventional rock bits in medium-hard formations, limited tests indicate that the penetration rate increases as the bit weight is increased and changes at a rate of 1:4.

Three-cutting element jet rock bits and conventional rock bits were used on controlled tests in the Midway shale formation from 7500 to 8215 feet in the Mallalieu field, Mississippi, and Anahuac shale from 6150 to 6700 feet in the Danbury field, Texas. Results of the tests are presented in Figure 23. The relationship established for three-cutting element rock bits, either jet or conventional, in the Midway shale, a medium-hard formation, is that the drilling rate increases as the bit weight is increased and changes at a rate of 1:2. The overall analysis of data indicates variation from this relationship; however, the 1:2 variation exists more often than not. Three-cutting element jet rock bits and conventional rock bits were used on controlled tests in the Anahuac shale. A directly proportional relationship for three-cutting element jet rock bits and conventional rock bits was established for soft formations.

It has always been acknowledged that increased bit weight on rock bits increased the rate of penetration; however, the rate of increase in penetration rate with bit weight has not been determined. On the basis of the above tests, it is apparent that the rate of increase will depend largely on the hardness of the formation being drilled and will vary from directly proportional to probably as much as 10:1 for the extremely hard formations. This is principally due to the changed compressive strength and the necessity to exceed the compressive strength of formations, in order to pass from the stage of wearing out the formation to the stage of chipping and drilling the formation.

TABLE 1

Comparative Data on Wells Drilled with Conventional and Jet Rock Bits

WELL	DEPTH—Feet From	DEPTH—Feet To	Number and Type of Bit	Feet per Bit	Total Hours	Feet per Hour
EAST TEXAS DIVISION:						
(8¾ and 8¾ inch Hole Sizes)						
Pickton Field:						
H. R. Folmar 1	2646	7937	37 Conventional	143	628 50	8.42
A. K. Jackson 1	2645	7905	31 Jet	170	467.50	11.25
T. S. Gibson B-2	2688	7950	27 Jet	195	445.25	11.82
C. M. Stephenson 1*	2655	7925	37 Conventional	142	517.75	10.17
WEST TEXAS DIVISION:						
Bronte Field:						
R. E. Hickman 3†	1792	4370	16 Conventional	161	206.00	12.51
Nannie Ash 4†	1690	4410	18 Conventional	151	212.25	12.80
O. M. Keeney B-1‡	1705	4370	14 Jet	190	181.75	14.66

* Used compounded pumps. † 6¾ inch hole. ‡ 8¾ inch hole.

Conclusions

The following conclusions can be drawn on the basis of the limited tests conducted on the factors affecting the rate of penetration of rock bits:

- The number of cutting elements definitely affects the drilling characteristics of rock bits and the merits of a bit design; a particular tooth structure or cutting element design is determined by the formation being drilled.
- The fluid distribution at the bit is an important factor in changing the drilling characteristics of the bit, both from the standpoint of penetration rate and durability of the bit.
- Where all of the fluid is directed to the bottom of the hole, an increase in penetration rate accompanies increases in nozzle-fluid velocity or circulation rate. For each formation, certain minimum nozzle-fluid velocities exist, below which the penetration rate is not materially affected by variations in the velocity of fluid being directed to the bottom of the hole.
- The rate of penetration was found to increase as the nozzle power factor is increased; however, the rate of

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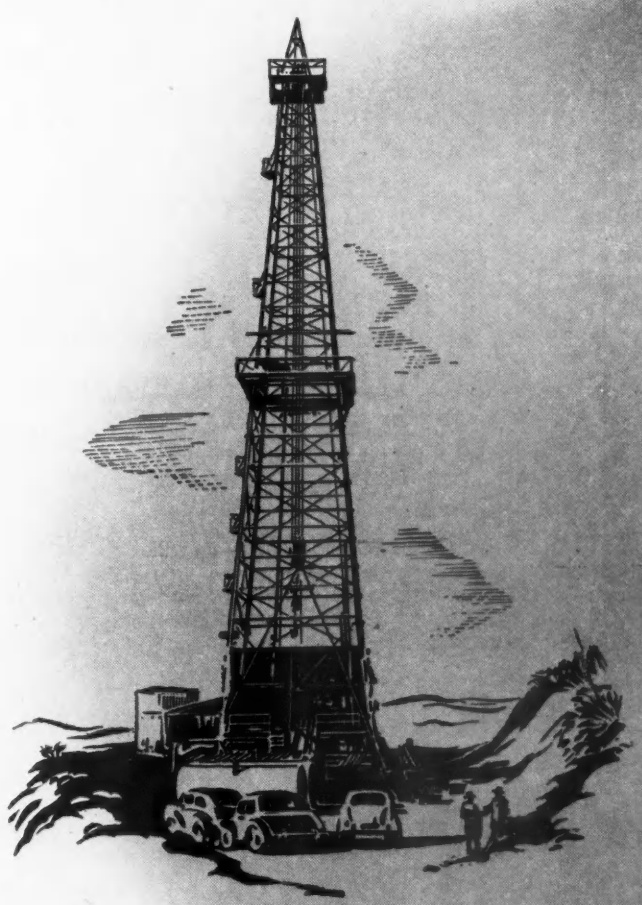

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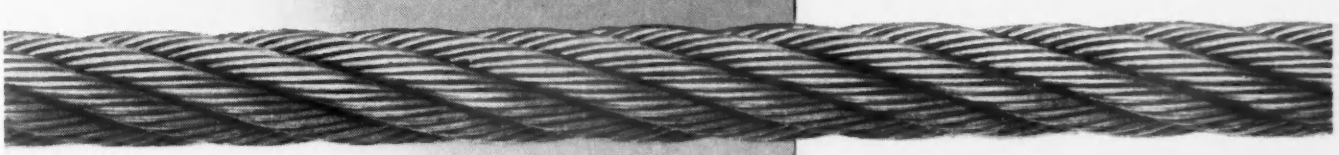

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change in drilling rate with changes in nozzle power factor is as yet undetermined.

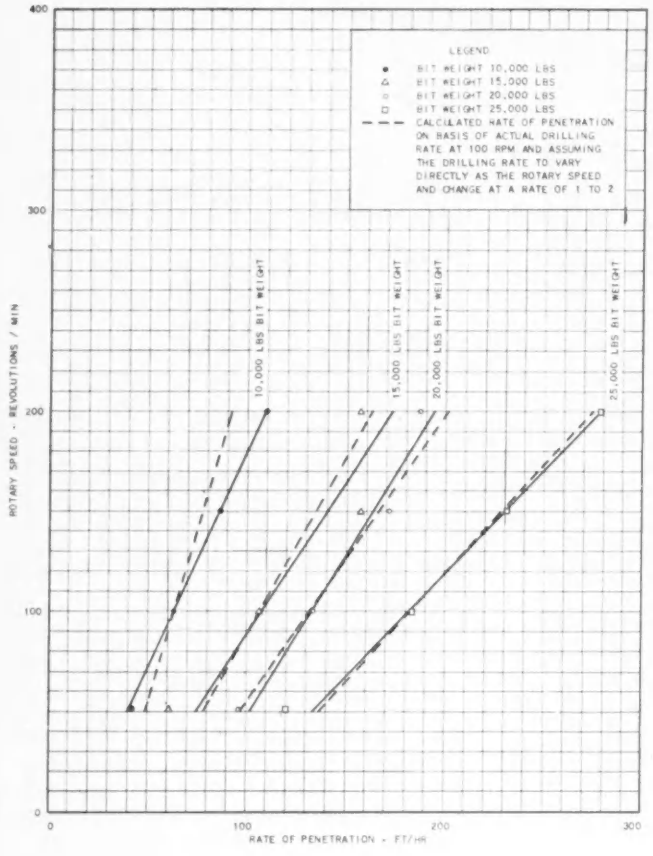
● The rate of penetration is a function of rotary speed and in soft formations the rate of change in drilling rate with rotary speed is approximately 1:2.

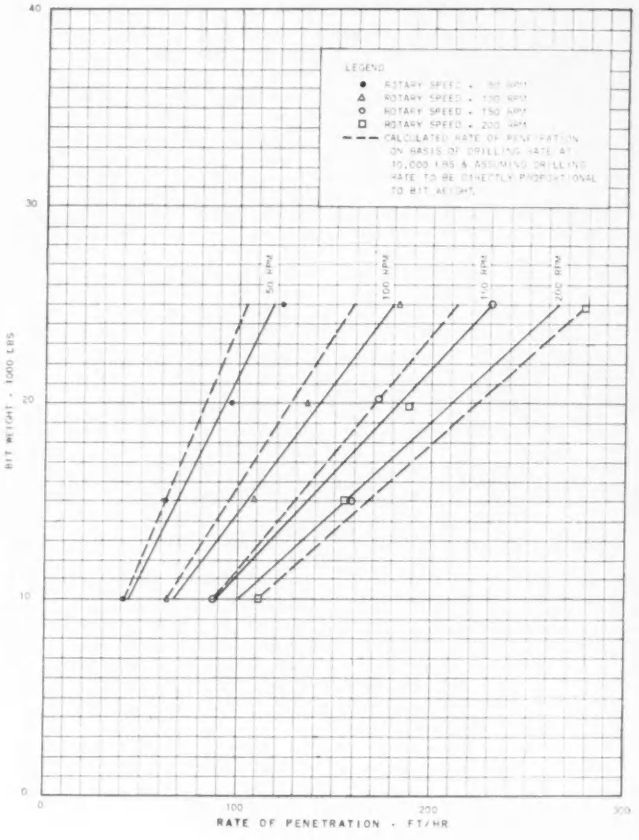
● The rate of penetration is a function of bit weight, and the relationship of bit weight to rate of penetration varies with the formation hardness.

Further research and field testing of all bit designs is planned with the emphasis at present being on a design utilizing the high fluid-velocity nozzles directed at the bottom of the hole.

ACKNOWLEDGMENT

The Drilling Practices Section of the Petroleum Engineering Division sincerely appreciates the help and fine cooperation on the part of members of the Petroleum Engineering Division who assisted in gathering data, and particularly on the part of the district and drilling-rig personnel concerned with running the many special tests required. Several manufacturers gave invaluable assistance in producing bits of special design on short notice. Acknowledgment is also made to the Humble Oil & Refining Company for permission to publish this paper.


LEGEND
BIT WEIGHT 10,000 LBS
BIT WEIGHT 15,000 LBS
BIT WEIGHT 20,000 LBS
BIT WEIGHT 25,000 LBS
CALCULATED RATE OF PENETRATION ON BASIS OF ACTUAL DRILLING RATE AT 100 RPM AND ASSUMING THE DRILLING RATE TO VARY DIRECTLY AS THE ROTARY SPEED AND CHANGE AT A RATE OF 1 TO 2
10,000 LBS BIT WEIGHT
15,000 LBS BIT WEIGHT
20,000 LBS BIT WEIGHT
25,000 LBS BIT WEIGHT
ROTARY SPEED - REVOLUTIONS / MIN
RATE OF PENETRATION - FT/HR


LEGEND
ROTARY SPEED = 50 RPM
ROTARY SPEED = 100 RPM
ROTARY SPEED = 150 RPM
ROTARY SPEED = 200 RPM
CALCULATED RATE OF PENETRATION ON BASIS OF DRILLING RATE AT 10,000 LBS & ASSUMING DRILLING RATE TO BE DIRECTLY PROPORTIONAL TO BIT WEIGHT
50 RPM
100 RPM
150 RPM
200 RPM
BIT WEIGHT - 1000 LBS
RATE OF PENETRATION - FT/HR

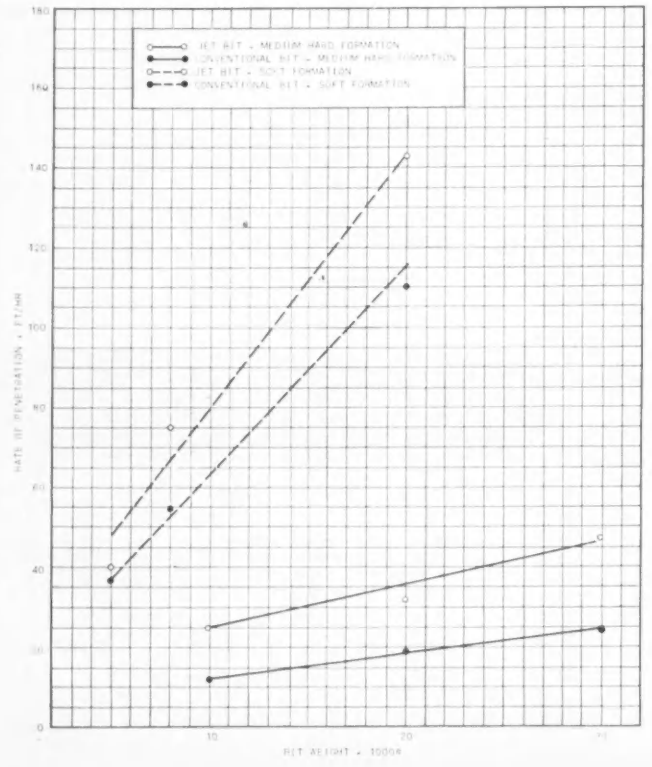

JET BIT - MEDIUM HARD FORMATION
CONVENTIONAL BIT - MEDIUM HARD FORMATION
JET BIT - SOFT FORMATION
CONVENTIONAL BIT - SOFT FORMATION
RATE OF PENETRATION - FT/HR
BIT WEIGHT - 1000#

FIGURE 21 (top left). Relation of rotary speed to rate of penetration of two-cutting element jet rock bits in soft formation.

FIGURE 22 (top right). Relation of bit weight to rate of penetration of two-cutting element jet rock bits in soft formation.

FIGURE 23 (lower left). Relation of bit weight to rate of penetration using three-cutting element rock bits in soft and medium hard formation.

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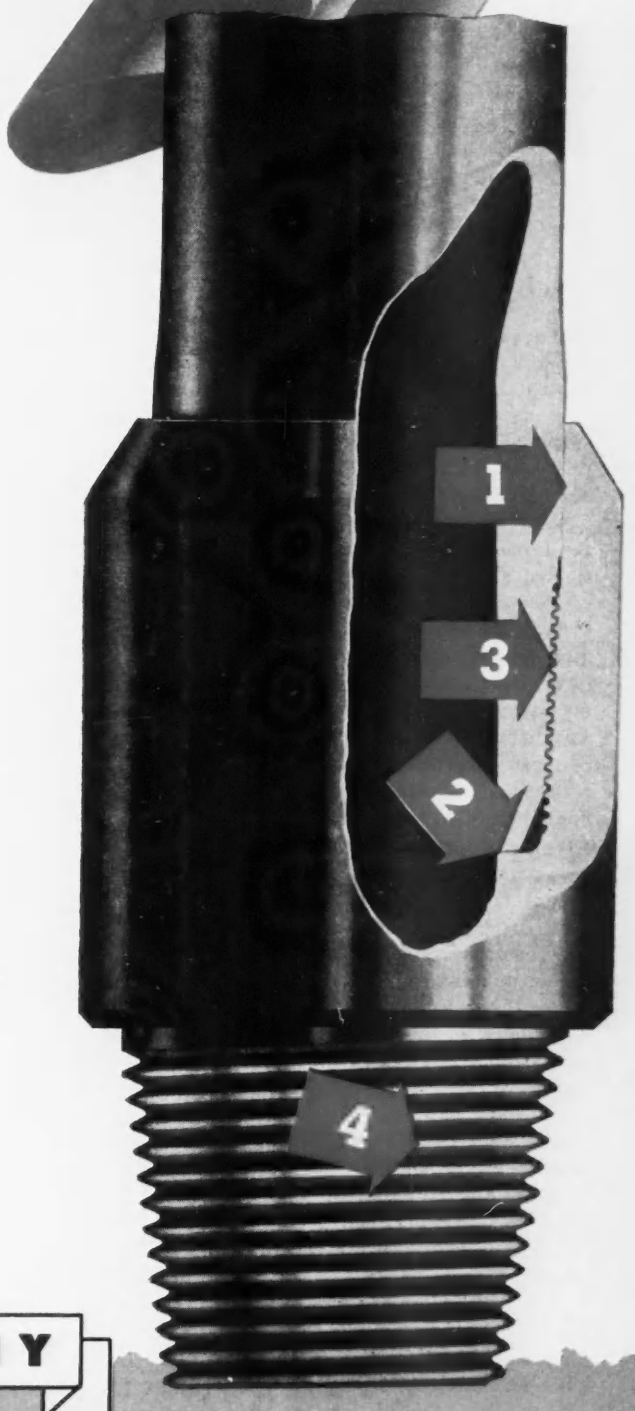

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SAFETY TRAINING By Specific Practice Problems

Part 3

Drilling Rig Safety—Pipe Slips and Elevators

By J. I. POWELL, Consultant

IN THIS discussion of drilling rig accidents and their prevention, the author discusses those mishaps directly involving slips and elevators, and develops the reasons back of observed accidents in these categories, making, in each instance, recommendation looking toward elimination of hazard and the insurance of safer working practices.

ONE reason for occasional costly mishaps in drilling an oil well is unsafe and inefficient performance on the part of the drilling crew. Such drilling crews can and have, however, been trained in alert and constructive thinking habits with regard to overcoming the things that contributed to those mishaps. Through such training in safe and efficient performance the causes for the accidents were eliminated and economy in operations attained.

It has always proven valuable to use an actual example to indicate the relationship between a happening and its consequential effects with regard to safety, efficiency and economy. The meanings of the three words, as related to the operation of a drilling rig, have a very close relationship.

During a period some months ago when a study was being conducted on the various mishaps that have occurred in connection with the Pipe Slip and Elevator Practices, a toolpusher with many years of experience behind him offered a case history of a mishap as his contribution to what he believed was a good cause.

He was anxious to see drilling crews trained to coordinate their acts, for he knew well that the lack of crew coordination within his own crew caused an expensive fishing job. He related his experience as follows:

A drilling crew was pulling a string of drill pipe out of the hole. They had reached a point where only four thribbles remained to be pulled. The men were working fast. A strong wind was blowing from a direction directly back of the elevator latcher.

The driller lowered the elevators to a height where he thought they would be latched around the pipe beneath the drill pipe box extending upward from rotary table. He saw the elevator latcher grasp the elevator horns and pull the open elevators toward the pipe. At the same instant, however, the driller turned to look down to clutch the drawworks.

The elevator latcher got the load-bearing rim of elevators beneath the major part of the tool joint box shoulder, but at that instant the block swung and pulled the elevators so tightly against the box that he couldn't latch them. The elevator latcher was standing there holding onto the horns waiting for sufficient slack to latch the elevators.

The backside elevator and slip man, having failed to recognize the actual situation, had leaned over and caught hold of the backside slip handle. He was preparing to lift on the slips as the pipe started upward.

As this situation existed, the driller clutched the drawworks and started the drill string in a fast upward motion. The traveling block was still swinging; the elevators were not latched around the pipe, and a strain had been taken on the pipe slips which pulled them along with the motion of pipe.

As the elevators pulled loose under tension they swung outward and away from over the center of rotary. The elevators struck the backside elevator and slip man in the face and then knocked him onto the rotary chain guard. The slips, being then out of the rotary, allowed the remaining drill string to fall back to the bottom of the hole.

FIGURE 1. Improperly latched elevators swing away from pipe, striking man at slips and releasing string of pipe so that it drops down hole, causing fishing job.

The consequence of this mishap involved three injuries to the backside elevator and slip man—facial lacerations, broken teeth and a back injury. There then remained a fishing job to start on, and it was understood that several days were required to complete it.

The real basic cause for this costly and injurious occurrence was a mental process habit. The habit in this case was that the driller took for granted that the elevators were latched around the drill pipe as he clutched the drawworks to hoist the drill string.

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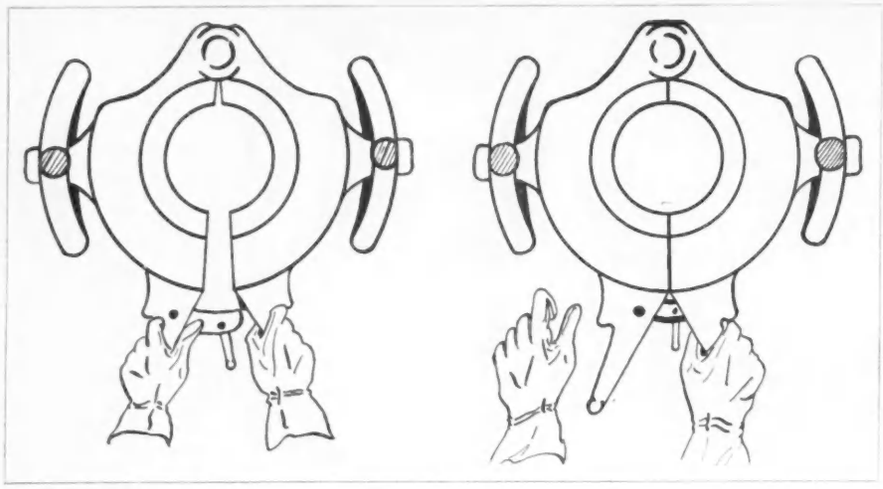

FIGURE 2. Illustrating use of hand position of elevator man to signal latching of elevators and safe time to begin lift with drawworks.

training and good supervision, providing a practical solution is developed and the necessary emphasis applied.

The first requirement in working toward such a solution is to have every driller understand that he is not to take for granted that elevators are latched when he starts picking up on a drill string. This, on the other hand, will of necessity cause some of the responsibility to be placed on the elevator latcher—and it should be that way.

Because of the unusually loud noise around some mechanical drilling rigs, the driller would have difficulty in hearing an elevator latcher, even if he attempted to use his voice to halt the driller's intended pickup in case the elevators were not latched.

The driller's vision is not hampered, but it should not be his entire responsibility to see that the elevator latch is properly closed when he is about ten feet away. The elevator latcher, on the other hand, is standing directly over the elevators; therefore, it should be his responsibility to indicate whether or not the elevators are properly latched.

Voice should not be depended upon in this kind of situation because of the distracting noise. Something large like the elevator latcher's hands can be easily seen by the driller. It is believed then that the most effective signal to use to indicate whether the latch is open or closed can best be accomplished by the position in which the elevator latcher's hands are placed. In other words, as long as the elevator latcher keeps both hands on the elevator horns, that should be accepted as a signal to the driller that the elevators are not latched properly.

When the elevators are around the pipe so that they appear to the driller to be latched, and the elevator latcher removes even one hand from an elevator horn, that should be accepted as a signal to the driller that it is all right to hoist. If the elevator latcher makes the mistake of removing a hand when the elevators are not latched, then he is the principal contributor to the resulting mishap—if there is one.

This procedure in performance will not, however, be effective if a driller assumes that by explaining to an elevator latcher once that he will always remember to do it exactly that way. A driller should not forget that he is responsible for progressively developing safe and efficient work habits within his crew. A driller should train himself to detect a sense of disregard on the part of a crewman for an accepted safe performance habit. When such a disregard is detected, the driller should realize that he, himself, once had to learn, and that nothing was perfected with just one course of instruction. When drillers show a calm, progressive interest in helping the men working under them to perform their work safely, there is better cooperation.

The operational practice comprising the use and manipulation of the pipe slips and elevators has its peculiar hazards. Since the handling of the pipe slips and elevators is so interrelated, the two have been studied with the view of reporting on hazards of both at the same time.

An original study was made of 700 accidents that occurred generally in the operation of a drilling rig. Those that occurred in connection with the manipulation and use of the pipe slips and elevators were separately studied.

It was found that out of this general group of accidents there were 76 or 10.8 percent of the total that occurred in connection with the pipe slips and elevators. There were 40 accidents involved with the elevator manipulation and 36 with the pipe slips.

Elevators Coming Down for Latching

It is important to consider the operational condition or situation that preceded the actual occurrence of any accident. An illustration of that point is evidenced, for instance, when the driller is letting the elevators down to be latched onto the extension of the drill string extending above rotary. This, of course, is when the drill string is being pulled from the well.

The elevators do not in all instances come down out of the derrick in a perfectly perpendicular fashion. They are often swinging due either to the wind pressure or to the derrickman's ill-timed manipulation, or the lack of proper handling on his part. Most derrickmen, of course, will complain that they have not sufficient time to rack their pipe stand and take the swing out of the blocks, too. Then, too, the derrickman, as well as any other crewman, realizes that little can be done in keeping the blocks falling straight down if a strong wind is blowing.

These facts should cause the driller and elevator latcher not to expect the eleva-

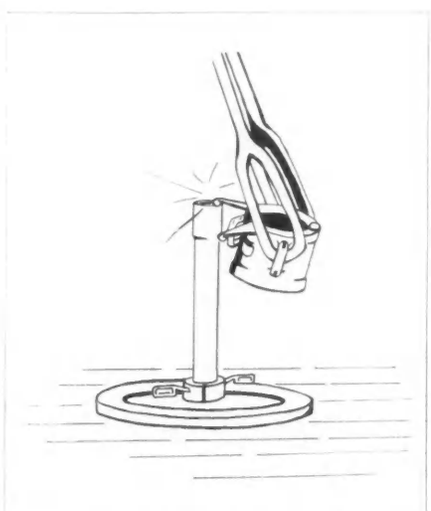

FIGURE 3. Elevators are swung against links when horn is allowed to strike pipe stand, endangering crewman's hands, if placed too low on links or outside safety grips.

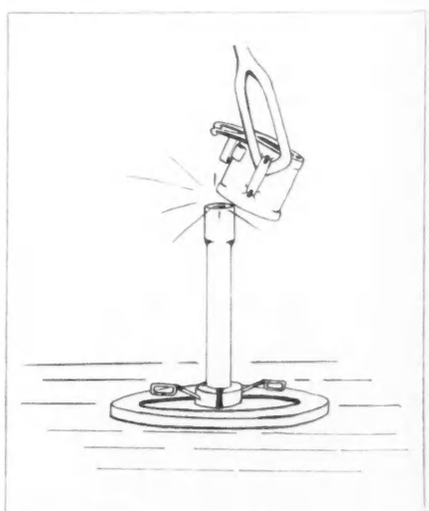

FIGURE 4. Contact between the elevators and the top of the stand in slips can cause serious injury if the crewman's hands are in the dangerous area.

tors to drop into the exact position for latching each time. As a rule, the elevators have to be pushed one way or the other as they come down before they can be pulled around the pipe and latched properly.

There is a real necessity for the driller being extremely cautious in letting elevators into a latching position. There is a matter of properly coordinating the fall of elevators with the action of the elevator latcher.

In illustrating this through the use of facts, it was found that out of 40 elevator accidents, 12 resulted when the elevator latcher, with his hands on the elevator horns, allowed one or the other to be caught between the horn and the top of the extended tool joint box. This happened as the driller let the elevators on down for latching before the elevator latcher had time to push the elevator clear of the box.

There were six hands mashed when elevator latchers allowed their hands to be caught between the elevator horn and the elevator link. In this situation the driller likewise let the elevators on down before the elevator latcher could push the elevator in clear of the box. The bottom of elevators collided with the edge of box and this action tilted the elevator body, thus pinning the men's hands between the horn and link.

Drillers who have never had one of their elevator latchers injured were asked the question as to what technique of timing they used to avoid getting the latcher's hands caught. Practically all of the answers were something like this: "I just set the thought in my mind that I'll bring those elevators down so as to stop them in the clear of the top of that box if necessary." The drillers who repeatedly had accidents within their crews were the ones who remarked that the point they had set in their minds as a stopping place was when the elevators got into latching position.

Braking a drawworks drum is very much like applying brakes on an automobile. When a driver gets in a "tight spot" in fast traffic, he definitely begins to think about the point he should not proceed beyond in order to be safe. If his judgment is bad about picking the safe stopping point and he gets beyond it, a collision usually occurs.

Within this same group of accident experiences, when the elevators were being let down for latching, there were three additional accidents. Two elevator latchers were injured as, with hands on elevator horns, they tried to pull the elevators in toward the pipe when block was in an outward swing. Hands were pulled loose from the horns and the men fell backward onto the floor. Elevator latchers have to realize that they have not enough weight to compete with the weight of a heavy traveling block. When a block is in a swing, it is better to concentrate on staying in the clear rather than trying to stop it from swinging. The act the man intends to do should be timed with the swing of the elevators.

There was only one occasion when the backside elevator man was injured within this group of closely allied experiences. He had hold of the links only a few inches above the elevators. As he pushed the elevators onto the pipe, the block swung sideways, or toward the drawworks; the elevator link was swung against the side of the tool joint box, and his hand, of course, was badly mangled. There is little doubt that this man was not thinking safely, and he was not watching where he put his hand with regard to the tool joint box and the swing of the traveling block.

Elevator Manipulation During the Pickup

Manipulating elevators at the time the pickup is started involves, according to past accident experiences, certain unusual exposures. In addition to the exposures of men being injured, there is also the exposure of the drill string being dropped into the hole.

The "pickup" here is intended to mean that situation when the elevators have been lowered to the lowest desired level, and the driller then clutches the drawworks for an upward movement of elevators.

The elevators, at the time the pickup is started, may or may not be properly latched. It may be that they were not intended to be latched as would be the case of running pipe into the hole.

An analysis of the 40 elevator accidents indicates that five occurred during the pickup while the elevators were being hoisted empty; in other words, as the pipe was being run into the hole and as the elevators were started up after another stand of pipe.

These accidents occurred as elevator latchers allowed their thumbs or fingers to be caught between some part of the moving elevator and the bottom radial edge of the tool joint box. This type of accident can be prevented by the driller continually cautioning his elevator handlers.

Another kind of accident that has happened during the pickup occurs when the elevator latcher fails to push elevators in the clear of the tool joint box shoulder as the pickup starts. The upper rim of elevator snags the box shoulder and tension is momentarily pulled in the hook spring. The elevators then pull loose under tension and swing forcefully away from the pipe. If the backside elevator man is standing close to the elevators, he is usually hit in the chest or face. Of the 40 elevator accidents, there were three of this type.

The next pickup phase is not involved with the intention of the elevators going up empty, but with their going up loaded, failing to take along their intended load. For example, the elevators are lowered, the elevator latcher goes through the motions of latching them around the drill string extension in rotary, but before they are latched the pickup starts. The result of the pickup being started before the elevators are latched, and after rim of elevators are caught under the box shoulder, contributes to both serious injuries to crewmen and to the dropping of drill pipe strings in the hole.

The details of occurrence and the solution for this type of mishap have already been given in the forepart of this article. From a statistical standpoint, there were four such bodily injury accidents out of the total of 40. There was no dropping of pipe strings involved, however, with these particular accidents.

Two accidents involved the act of dropping singles out of elevators as the pin-end of single was extended out of the V-door. The hands were caught between the bouncing pipe singles and elevators. Three accidents occurred during the act of attaching elevators to links. The elevators were dropped on the men's

FIGURE 5. Worn slips or bowl can cause a hazard to crewmen by reducing clearance between handles and rotary table.

FIGURE 6. Descending elevators strike improperly placed slips, driving them against crewman's foot and causing serious injury.

FIGURE 7. Using the foot to add weight to improperly gripping slips places crewman's lower leg and knee in path of descending wrench and may cause serious injury.

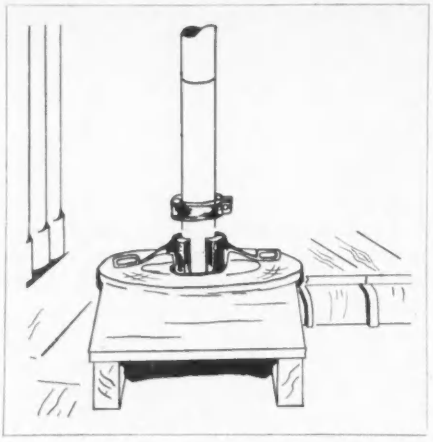

FIGURE 8. When there is not sufficient weight in collar string to set slips securely, crewmen must be cautioned against placing hands between safety collar and slips.

feet. Only two eye injuries were involved in the 40 elevator accidents.

Setting Slips on Downward-Moving Pipe

The act of pulling and setting slips on a downward-moving string of drill pipe can be very hazardous under improper conditions. It will be recalled that there were 36 out of 700 drilling rig accidents that were involved with pipe slips. Fourteen of the 36 occurred during the act of setting slips on downward-moving pipe strings.

Nine of those were the result of the slip setters getting either their fingers or toes between the rigid handles of the slips and the top of rotary. One of the reasons for this kind of accident happening is that the tapers of slips and rotary bowl were allowed to wear excessively. This unusual wear often allowed slip handles to be lowered to within a half inch of the rotary table.

Aggressive oil field machine shop operators have done much in lessening this type of accident. They have acquired several sets of pipe slips and have gone from rig to rig in search of badly worn slips. Where such were found, they have sold the toolpusher or driller on the idea of their building up the taper so that the handles would stand up at least five inches above rotary table. These shop men would leave their own slips while repairs were being made to the contractor's slips.

Occasionally there is an accident due primarily to a driller's habit of running the pipe into the hole too fast. One accident, the result of such unnecessary action, was caused by the fast-moving elevators colliding with the top of the slips just as the slips were tilted and ready to be pulled into the rotary bowl. The impact of the elevators against the top of tilted slips caused the slip handles to be jerked from the hands of the slip setter. The one-piece slips naturally spread open. One of the handles came down across a man's foot and crushed it.

There is always the necessity, of course, for teaching slip setters where to place their feet during the act of pulling slips.

A driller once told of an experience where the slip setter had both feet on top of the rotary table. As the elevators came down carrying the pipe string, the man started to jerk the slips into place. When he jerked, both his feet slid from under him. The slips were jerked into the bowl all right, but each of the slip handles was then resting across the top of a knee. Both this man's legs had thrust forward, one on one side and the other on the other side of pipe.

The driller was letting the pipe move slowly downward but he had not anticipated such a happening. As the man's legs slid beneath the slip handles, the driller applied all his weight to the drum brake. The movement of the pipe was stopped just before the elevators ran into the top of the slips. It was determined later that the clearance between those particular slip handles and the top of rotary was only 1½ inches with the pipe load resting on the slips. Both of the man's knees would have been crushed to a pulp if it had not been for the driller's habit of running pipe into the hole with absolute control as the elevators neared the top of the rotary.

Some drillers explain their technique of control in words similar to this: "When the tool joint on the bottom of the top single of the stand starts through the rotary, I start getting that string of pipe under such control that I could stop it on a dime." No record of any accident experience has been found that involves any of those particular drillers; that is, with one where the elevators were run into the slips during the slip-setting act.

There were a few miscellaneous accidents that occurred during the slip-setting act. Two happened as a result of the slip setters letting their hands pull loose from the slip handles during the setting act, and then falling backward onto the floor. There were also two resulting injuries from the slip setters' jerking the handles of the slips into their shin bones.

Pulling Slips on Pipe During Pickup

The principal kind of exposure to injury to which men are subjected in the act of pulling slips from around pipe during the pickup is muscular strain. There were 12 accident experiences assigned to this particular group. Nine were back strains. One shoulder was strained, and the stomach muscles of one man were strained. There was one instance in which the slip puller let his hand pull loose from the handles and he fell backward onto the floor.

Ten of these 12 accidents occurred during the operational process of running pipe into the hole. The other two occurred as the pipe was being pulled out of the hole.

One need not be reminded that a slip puller can strain himself by pulling excessively on a pair of slips that are not yet loose enough to be pulled from the rotary bowl. Many of the older and more experienced slip pullers say that, instead of straining at the slips, the handles should be held tightly together and the motion of the pipe allowed to pull them out of the rotary bowl. As soon as most of the taper of slips is clear of the rotary bowl, the handles can be opened quickly and the slips removed from around the pipe.

Stationary Pipe and Dependence on Slips

Occasional necessary work acts are involved with stationary pipe and where safety is dependent upon the pipe slips holding, or the crewman being in a safe position if the slips do not hold. An illustration of what can happen under adverse circumstances will be given: A few singles of pipe extended into the hole and these were set on slips in the rotary. Another single was added to the string and it was being made up with a regular 36-inch pipe wrench. The slips were not holding the pipe securely, so a crewman put his foot on the top of the slips and directly beneath the pipe wrench handle. The pipe at the same time slid down through the slips. The man's leg, from knee to foot, was, of course, caught between the wrench handle and the top of the pipe slips.

Another man had his thumb between the drill collar safety clamp and the top of the pipe slips when jar and vibration caused the drill collar to slide through slips that were not holding.

In both of these cases the pipe slips were not loaded sufficiently to make them hold as well as if they had been heavily loaded. The slips, too, were slightly dull. The common-sense way to avoid such accidents is not to put a member of the body in such a position where it will be caught in the event the slips fail to hold.

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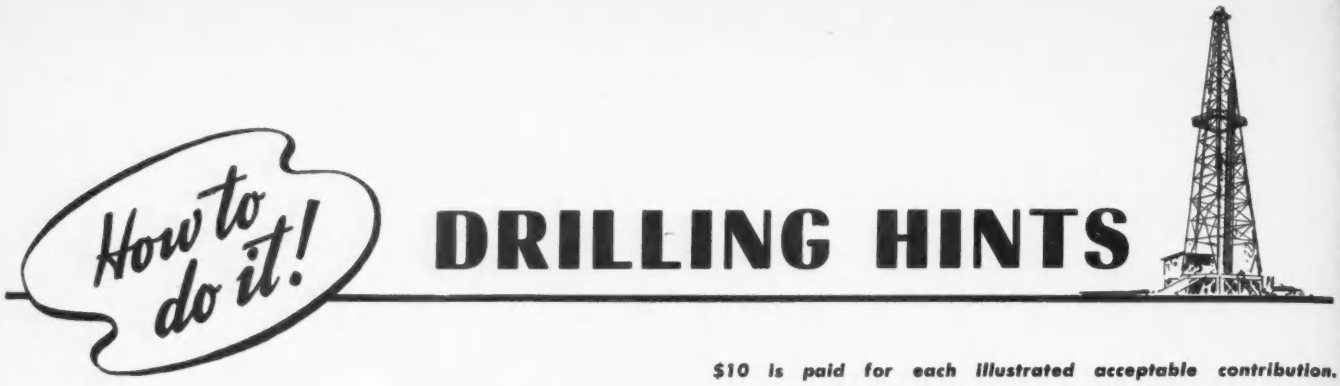

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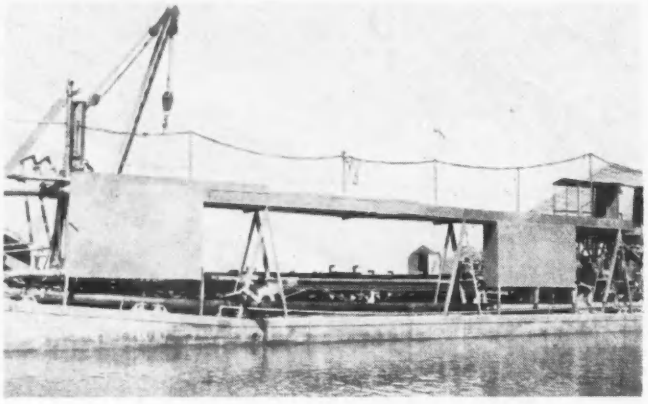
HOW TO—Remove Sand from Drilling Fluid

Sand grains so fine that they pass through the shale shaker screen can cause severe damage to pump liners and valves as well as to the entire mud system if this sand is not removed. On land rigs where ample space is available to dig extra settling pits, the problem can be handled simply. However, the space problem on barge rigs used in the swamps is critical and it is sometimes necessary to "double deck" equipment.



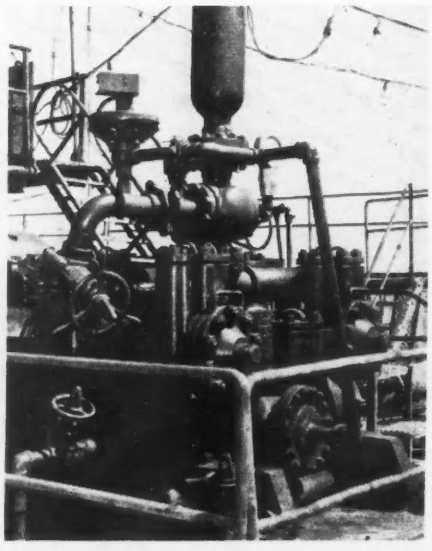
Here is a simple yet effective design for the mud trough which permits the inclusion of sand settling pits. The mud return line may be seen at extreme left supported about eight feet above the edge of the auxiliary barge. This barge contains the pipe racks, tool houses and boom crane. The mud return ditch is maintained in the elevated position completely across the barge.

The ditch, made of plate steel about two feet wide and about 18 inches deep, is greatly deepened at either end of the barge to make two large boxes. The ditch is deepened from the 18 inches to about six feet, and the box is approximately seven feet long. It serves simply as an enlarged section of the ditch where the agitation of the mud flow is lessened so that sand may drop out. By employing two such settling pits, the removal of sand is doubly effective.

Sand and cuttings collected in the bottom of each box are flushed around the well head to build up the mud bottom. Since the water is only eight to ten feet deep, sand deposited around the surface pipe will tend to consolidate the soft muddy bottom. Sand collected in the pit at right is dumped into the canal adjacent to the barge.

HOW TO—Discharge Pressure Relief Valve

Should the mud line leading to the standpipe be accidently shut when the mud pumps are operating, a mud pressure relief valve in the line adjacent to the mud discharge from the pump will relieve the pressure and prevent severe damage to the pump. It is normal practice to connect the discharge port from the pressure relief valve to a smaller line leading back to the mud return ditch or pits, whichever is nearer the pump. An operator using a relief valve with no discharge port connections either trusts to luck that the valve will not be needed, or thinks that on the very infrequent occasions it is popped, the cost of cleaning up plus the lost mud is less than fabricating the discharge piping.



Illustrated is one method of handling the discharge from the mud pressure relief valve should the valve pop due to excessive pressure on the line. The discharge port of the valve is connected by 1½-inch pipe to one of the suction openings of the pump. The mud pump shown is equipped with three-way suction ports, two of which are flanged, with a reduced line welded to the flange. When the relief valve pops due to excessive pressure, the flow of mud is directed back into the suction and the fluid is circulated without damaging the pump before it can be stopped.

In the design of most mud pumps, more than one suction is provided. By piping the relief valve discharge port to the unused suction, considerable pipe is saved, and in many rig moves the hookup can be left intact for the next well.

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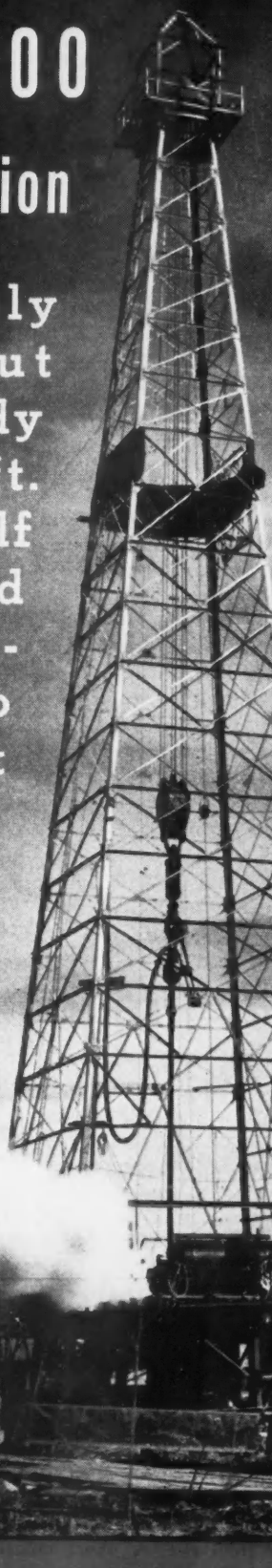

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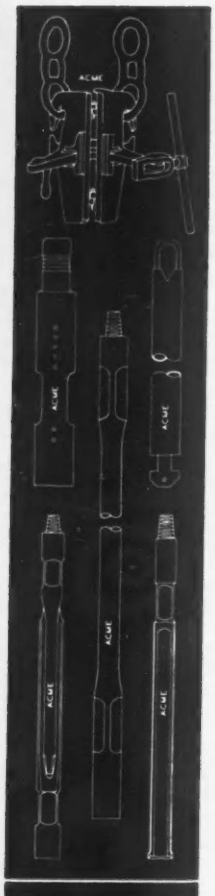

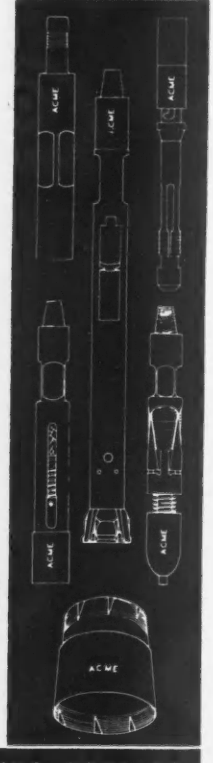

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HOW TO—Collect Rain Water

The type of water used in the cooling systems of diesels or gasoline/gas engines influences to a large extent the maintenance problem. For power rigs operating in wildcat country where pure fresh water is not available, and where it is not economical to drill a separate water well, rain water offers possibly the best solution to the cooling water problem.

In the case illustrated, the rig is located near salt water, and water used on the rig is furnished by small canal containing brackish water. The amount of makeup water required for the radiators is not great, and a simple water collection system, similar to that used on many farms, is used.

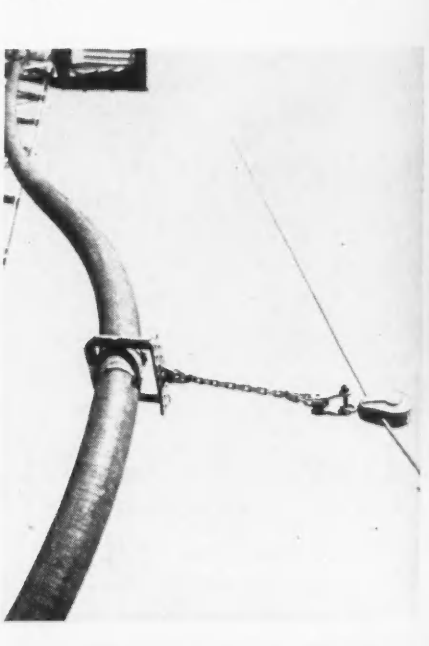
The drawworks and four diesel engines are completely covered by a sheet metal roof supported by a welded pipe framework. The roof slopes from the edge of the derrick back to the overhang on the rear engine. A galvanized tin gutter is held by heavy steel plate brackets which are hooked over the roof framework. The gutter has a gentle slope so that water draining off the roof and collected in the gutter flows to this lower end. A plate steel box attached by a coupling to a vertical piece of 2½-inch pipe carries the rain water into an open steel drum which serves as storage. A small centrifugal pump takes suction from the steel drum to pump the rain water into the radiators of the four engines.

HOW TO—Prevent Scuffing Hose

The problem of preventing scuffing and damage to the rotary hose on the lighter types of rigs was solved by one West Texas drilling contractor by the installation of a simple device which holds the hose away from the derrick legs regardless of whether the swivel is high or low in the derrick. Slightly below the approximate mid-point of the hose a fabric sleeve was taped on and to this was attached a square holder of an inside diameter only slightly larger than the hose diameter. The device was made of a U-shaped rod, on each leg of which was placed a length of pipe which serves as a roller.

The other side of the square was closed with a flat bar to which was welded a steel eye. A short length of chain attached to this eye was connected to a small sheave, the latter riding up and down a tautly-stretched length of sand line extending from a corner of the finger board down to the derrick floor.

The device is easily installed, saves considerable wearing and scuffing of the hose, and limits swinging of the hose when pumping at higher-than-usual pressures.



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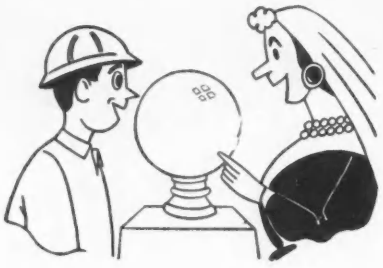
HOW TO—Connect Steel Ramp to Rig Pipe Walk

A steel ramp that embodies unusual strength, is securely anchored to both derrick floor and the pipe walk, yet is exceptionally easy to assemble and disassemble, is being used by a West Texas drilling contractor. Constructed of I-beams spaced on 12-inch centers and covered over with steel plate, the ramp has an attaching device that can be rigged up quickly and without danger of its coming apart while in use.

The accompanying photograph, taken from beneath the ramp, shows the method used for joining the ramp to the pipe walk. Two six-inch lengths of 2½-inch pipe are employed at each of the two connecting points. In the connector, one of the six-inch pieces of pipe is welded to the ramp and the other is welded to the end of the walk, these being positioned in such a manner that when the ramp is installed, the two pieces of pipe will be aligned with each other. A 12-inch length of solid two-inch round bar is thrust through the pipe sections when the latter are aligned. A length of chain is looped through connector links at either end of the solid bar, preventing any likelihood of the bar slipping out as a result of vibration.

The connections are simple and easy to install. They have the advantage of being strong, easily assembled in the field, and providing a hinge action which allows the ramp to fit.

HUNTING FOR OIL?



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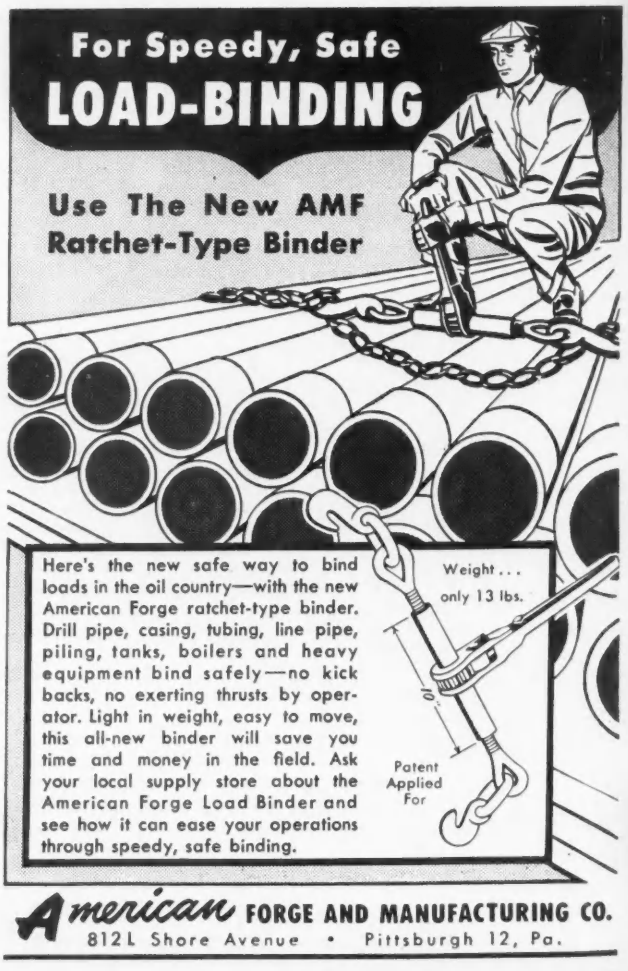

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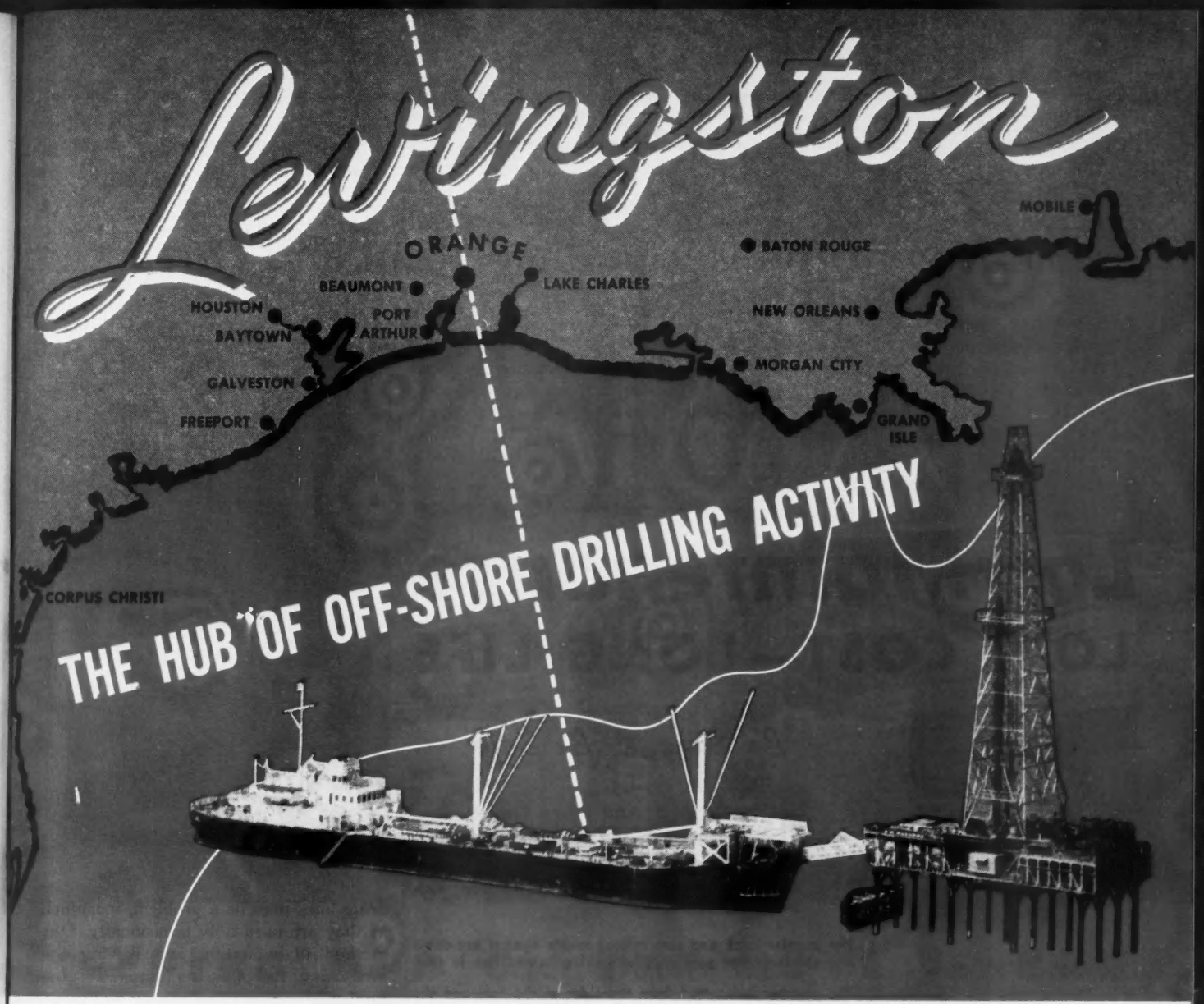

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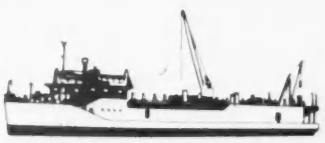
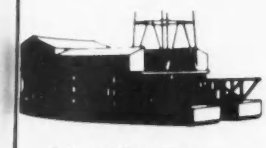
Non-self propelled oil well drilling tenders—converted LST's

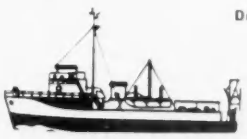


Drilling barges converted from navy seagoing barges.

Self-propelled oil well drilling tenders—converted Lst's

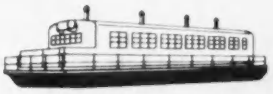


Submersible drill barges

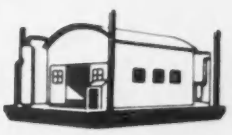


Vessels for geophysical exploration

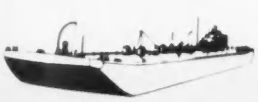
Crew boats



Boiler and power barges



Compressor barges



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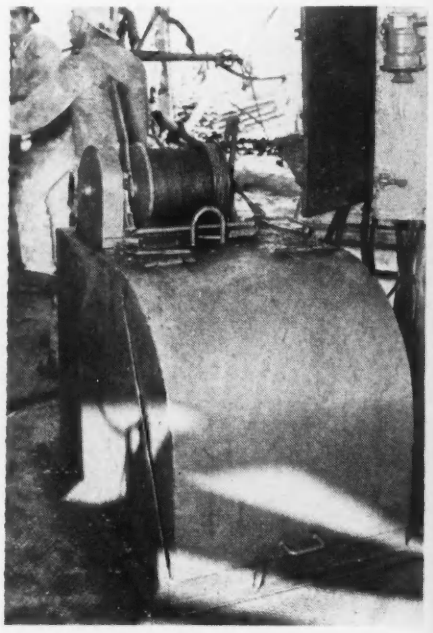
Tugs

HOW TO—Mount Measuring Line Reel and Drive

There are numerous cases which arise on the drilling rig when a measuring line is needed. Checking the cement plug to bottom is one, while measuring the depth of the well is another. The measuring line assures the driller of a fair check with drill pipe measurements on depth to bottom, and such assurance is always welcomed in instances such as fishing and others.



The location and mounting of measuring lines may be a problem, inasmuch as they are used only occasionally. One method of mounting and driving the measuring reel that has proven satisfactory over long periods of operation, makes possible safe control of the line.

The reel itself is pivoted on bearings contained in bracket supports welded to the top of a metal housing made of one-quarter-inch sheet steel. One end of the reel axle is fitted with a V-belt pulley shielded by a belt guard. A heavy steel extension arm shown between the reel and the pulley belt guard serves to mount the depth indicating equipment, which, because of its delicate construction, must be stored separately.

The reel is driven by a direct-current electric motor mounted on a frame inside the steel plate housing. A hinged door with handle as shown makes inspection and greasing of the motor possible. The motor is controlled by an electrical rheostat and a mechanical brake, the levers for which are hinged to the reel bracket at the right end. When going in or coming out of the hole, the operator has full view of the floor, including the drawworks, and can easily retard the fall of the weight in the hole, or he can stop the descent entirely. The device is out of the way to one side of the drawworks, and is ready at all times for use.

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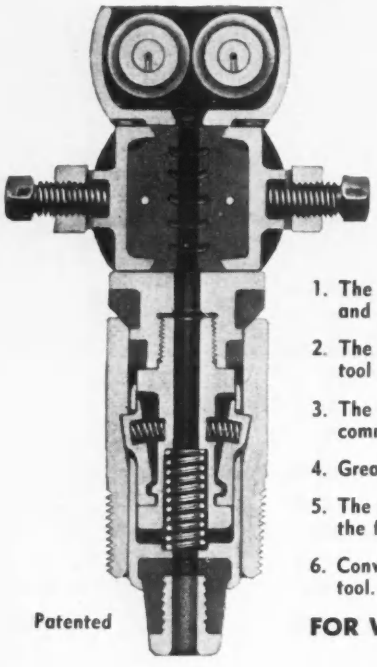

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STRIPPER FOR SWABBING TUBING

Type 3AR King Wire Line Stripper ("Oil Saver") is the ideal tool to use in connection with swabbing operations.

1. **The positive latch and sure release insure against accidents and eliminate the possibility of jerking a wire line in two.**
2. **The packing is inserted from the sides of the tool and the tool can be repacked while the line is in the hole.**
3. **The roller line guides center the line; outlasts the more commonly used bushing many times.**
4. **Grease nipples are provided to lubricate the guide rollers.**
5. **The non-sparking materials used in its construction minimize the fire hazard.**
6. **Convenient hand holds contribute to easy handling of the tool.**

FOR WIRE LINE CORING THE 4AR KING WIRE LINE STRIPPER IS WIDELY USED

The Type 4AR Stripper is similar to the Type 3AR, except it is a little larger. It is commonly used in connection with the Type 4C King Circulating Head. It can be, and sometimes is, used with other makes of circulating heads.

These tools are constantly coming into greater use. A trial is convincing.
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See your Composite Catalog for detailed description of other King Tools.

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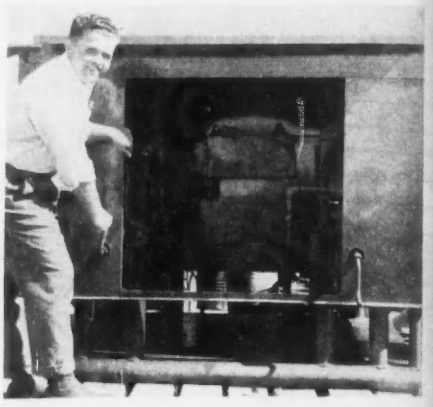
Complete
DRILLING MUD SERVICE
DEALER

HOW TO—

Set Up Light Plant With Standby Unit

A complete light plant with standby unit may be arranged into one skid-mounted unit as shown. The engines and generators are set side by side with a common fuel tank mounted on the back wall of the building. The tank is filled from the outside of the building and a line leads to each of the carburetors of the engine. The front wall is placed against the front of the engines so that the cranks protrude through a hole where they are easily accessible to the operator. The door is wide enough so that if trouble is encountered in either of the units, the entire unit can be removed by loosening four bolts and sliding the unit out the door.

The roof is made of a section of used tank steel which has served its useful life as a panel in the side of a tank. The skids are fashioned from scraps usually found around an oil field yard using four-inch pipe for the skids and four-and two-inch pipe for the uprights. A sheet of tank material is welded between the skids to strengthen the assembly.

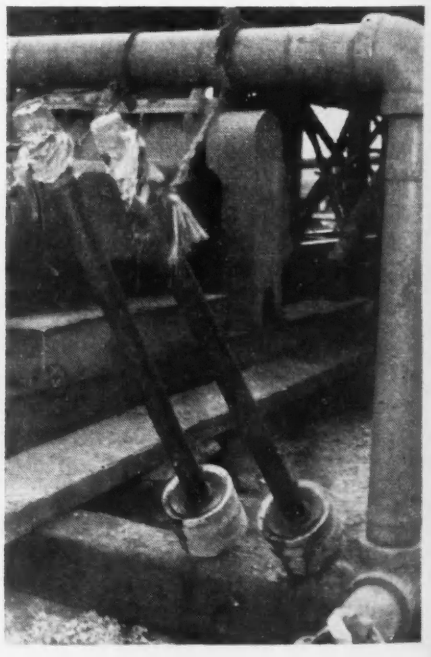


HOW TO—

Keep Pistons Ready For Installation

When it is known that pistons and rods on one pump are to be pulled during the next round trip out of the hole with the drill pipe, the new rods and pistons can be set out ready for installation. A convenient way of handling these parts is illustrated.

Both rods and pistons are suspended by strands of catline to the overhead mud pump discharge line. The piston end of the assemblies rest on a 12- by 12-inch timber, but the rubber section of the piston is held off the cross piece by the nut on the end of the rod. Oiled rags cover the threaded end of the rods to prevent dust or dirt from gathering on the threads.



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the first to bring these advantages

LEAVES NO JUNK OF ANY KIND IN THE HOLE

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YOU CAN SEE IF THE CHARGE HAS FIRED

Because of the ingenious design of the Schlumberger Shaped Charge Gun, you can actually check that the charges have fired. Thus, you do not pay for misfires.

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The Schlumberger Shaped Charge Gun cannot be fired if any liquid (water, oil, or mud) enters the gun.

In keeping with Schlumberger's policy of presenting only thoroughly proved products and equipment to the oil industry, we have withheld presentation of the Schlumberger Shaped Charge Gun until it was proved fully in laboratory and in field tests. Schlumberger Shaped Charge service is now available in the Gulf Coast area and Southwest Texas.

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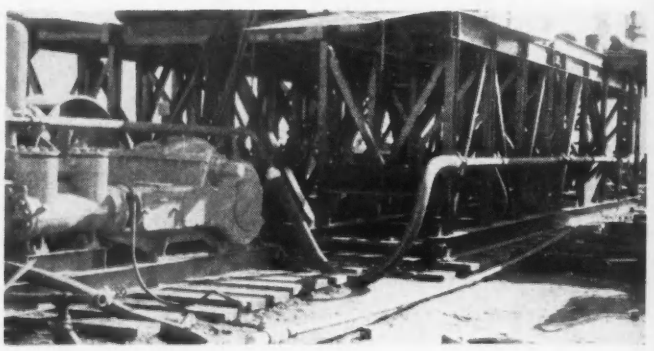
HOW TO—Improve Mud Assembly



A practice gaining in popularity among West Texas contractors consists of mounting the high pressure mud line several feet above the ground on the side of the rig substructure. This provides greater accessibility for servicing connections, and by breaking the line into several sections, the several pipe sections can be transported as integral parts of the substructure units.

A short length of hose is employed in making the connection between the permanent line and the mud pump. This type of installation provides piping that does not have to be broken down and moved separately each time the rig is moved and eliminates the need to anchor the line to the ground for snubbing of vibrations. The line is less likely to be injured in the elevated position, and in holding lines off the ground it permits crewmen to keep the surroundings cleaner and neater.

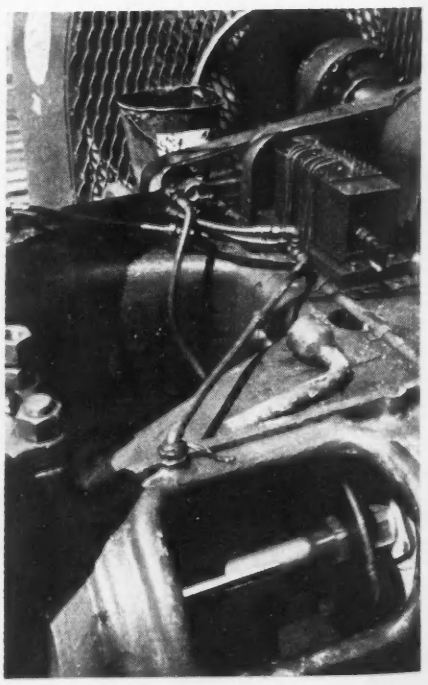
HOW TO—Lubricate Pump Rods

There are possibly as many different ways to lubricate the polished rods of a heavy-duty mud pump as there are mud pumps, but here is an efficient way of doing this job. The method illustrated utilizes thick lubricating oil which is circulated continuously over the polished section of the piston rods so long as the pump continues to operate.

A small rotary gear-type pump is V-belt driven from the power shaft of the power mud pump. The V-belt extending around the open shaft is covered by a simple tin guard to prevent accidents while the pump is in operation.

Discharge from the small rotary gear pump is through half-inch oil-resistant hose which connects to a tee on top of the pump housing and between the two cylinders as shown. The tee connects into two legs of the lubrication system, each leg being of half-inch galvanized water pipe. These lines lead to a discharge point directly above the polished rods where the oil falls in a continuous stream while the pump is operating.

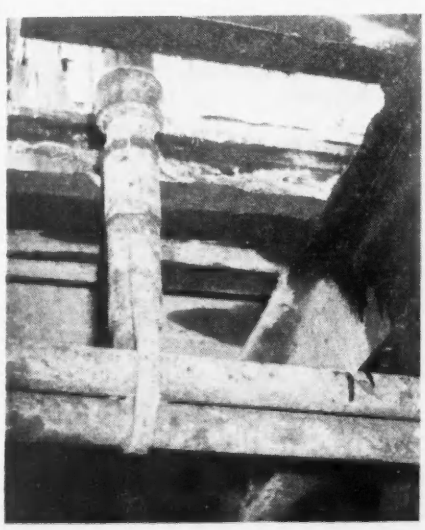
The lower part of the pump housing below the polished rod is connected into a common oil sump on the ground between the two cylinders. Oil drains from the two polished rods into this sump where the rotary pump again picks it up for distribution to the rods. The rod lubricating system is located out of the way, is simple and eliminates much scoring of the rods.



HOW TO—

Fix Traveling Block When Rig is Skidded

A method of tying down the traveling block to prevent it from swaying while the rig is being skidded, and which requires only a small amount of time to place it in operation, is used to good advantage by a drilling contractor operating in the West Texas area. When drilling operations stop, the block, with kelly still attached, is lowered through the rotary table opening until the lower end of the kelly nearly touches the ground. The kelly then is stabbed into and made up in a tool joint which has been securely welded to the center of a



bundle of three short lengths of drill pipe. The block is hoisted until the bundle comes up against the under side of the rotary support beams, a slight strain is taken with the drawworks, and the brake then is set.

This method eliminates the necessity of laying down the block, lashing it to one side or in any way fouling up the lines. When the rig is set up at the next location, it requires only a few minutes to lower the block, remove the bundle and pull the traveling block up and out of the way.

The three pieces of drill pipe making up the bundle are of 4½-inch drill pipe and are nine feet long. They are welded to each other at a number of places to make a single, strong beam. A ⅝- by two-inch steel strap is wrapped around the beam and welded to each side of the tool joint to make sure that the joint cannot be broken loose.

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Separately, these exclusive Laughlin fittings are tops in their own particular jobs. Together, they form a team that can't be equalled for cost-cutting efficiency. Put them to work for you, saving time, labor and money! . . . Write for Laughlin's Catalog 145, data book of the industry. THE THOMAS LAUGHLIN COMPANY, DEPT. 23, PORTLAND 6, MAINE.

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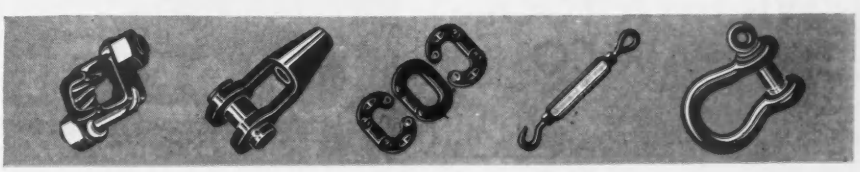

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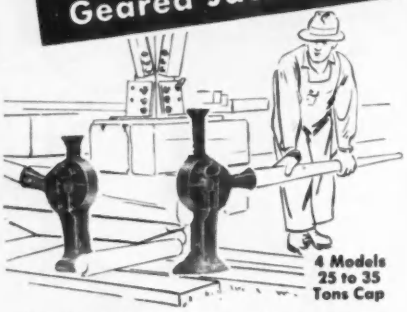

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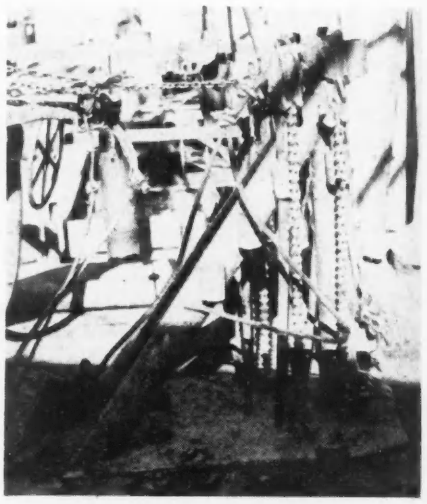
HOW TO—Care for Small Tools

Hand tools and other small objects used around a drilling rig suffer a high mortality rate unless special means are provided for their care and storage. When coming out or going in the hole, all hands are occupied, and no one has time to return small tools to a storage bin or cabinet. However, if the storage place is located within reaching distance of the rotary, chances of keeping these tools in place are considerably greater.

The reinforced pipe tong backup post shown has been utilized to a maximum in the storage of various size pipe tongs, pry bars and wrenches frequently required on the derrick floor. The post is constructed in a conventional manner with two 45-degree angle braces. To each brace has been welded nipples of two-inch and 1½-inch pipe. The handles of pipe tongs and other tools are inserted in the nipple. The tool may be supported by the head, or the handle may rest on the floor. In this manner, the tools can be quickly selected for use, and can be easily returned to the rack when their use is no longer required.



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Low Temperature Separation

Increases Recovery of Condensate from Natural Gas

By

ARTHUR F. BARRY
The Superior Oil Company

and

ASBURY S. PARKS
Engineering Consultant

THE TEXAS-LOUISIANA Gulf Coast is dotted with high-pressure gas-condensate wells which have provided the operator with endless problems. The formation of hydrates and subsequent freezing up of production equipment has been investigated for a number of years, and now a step further has been made in increasing the recovery of condensate from such wells.

THE production and transmission of high pressure gas is fast becoming one of the major industries of this country. It has been only a relatively short time since the oil operator considered natural gas a nuisance because it had little commercial value. The southwest oil country was dotted with shut-in gas wells, most of which had been completed in anticipation of oil production instead of gas. Once completed, the total lack of a market for gas kept these wells standing shut-in.

With the coming of chemical industries that use natural gas for raw material, and the building of transcontinental pipe lines, gas became a valuable commodity.

Deeper drilling has resulted in the discovery of a relatively large number of high pressure gas-condensate reservoirs. As depth increases, pressures increase; control of such high pressure gas condensate wells presents problems not before encountered.

The material produced from a typical high pressure gas-condensate reservoir is a mixture composed principally of the lighter hydrocarbons. There are occasionally other gases present, such as nitrogen, carbon dioxide, and hydrogen sulfide, but the operator is ordinarily concerned only with the hydrocarbons.

The hydrocarbon mixture cannot be termed either gas or liquid, nor can the product from such a well be said to have any given gas-liquid ratio without stating the conditions of pressure and temperature under which the mixture exists. The conditions of pressure and temperature alone determine the relative fraction of a well stream material existing as gas or liquid, and the state of such material can vary from total liquid to total gas, or any proportion in between.

Thus, it is reasonable to expect that the control of temperature and pressure of a gas-condensate stream has a very important bearing upon the gas-liquid ratio existing at any particular point, and by manipulation of pressure and temperature, the gas-liquid ratio can be controlled. This is the case, but as the combined effect of pressure and temperature upon a gas-condensate stream is rather complex, there is considerable misunderstanding as to what "optimum" operating conditions for a field separator really are.

Under bottom hole pressure and temperature conditions, there is no liquid present; all material exists as gas. As this bottom hole gas flows up the tubing to the well head, the temperature and pressure drop to some extent, with the result that some liquid condenses. As the well head mixture of gas and liquid flows through the control system, the pressure and temperature are further changed, the usual result being that more liquid is condensed. If the stream were passed through a separator during its handling from the well head, the gas-liquid ratio would be that determined by the temperature and pressure of the stream at the point where separation of gas and liquid occurred.

Gas-liquid ratios are usually expressed as stock tank liquid against separator tail gas, and this introduces another factor in the measurement of this ratio. This factor is the shrinkage of the liquid in passing from separator pressure to stock tank pressure. Such shrinkage will vary primarily with separator pressure; the higher the separator pressure, the greater the shrinkage loss. The separator temperature also affects the shrinkage, but to a lesser degree; the colder the separator, the greater the shrinkage loss.

In the operation of a field gas system, the operating conditions of the separator are limited. For all practical purposes, it is necessary only to investigate operating pressures between well head pressure and gas line pressure, and temperatures ranging from those obtained with a conventional indirect gas heater down to temperatures obtained by expansion of the gas without the addition of heat.

Typical gas-condensate stream behavior is best illustrated by data obtained from field tests on a producing well. Figure 1 shows the effect of separator temperature variation where the separator pressure is held constant. Within the range of temperatures tested, the liquid accumulation increases at a uniform rate as the temperature drops. Note that the liquid quantities are as measured at separator pressure, and have had no shrinkage loss applied.

Figure 2, a cross plot of the data shown on Figure 1, illustrates the behavior of gas-liquid ratio where the separator temperature is held constant, and the pressure varied. This shows the well-known "retrograde condensation" characteristic, which has been the cause of widespread misunderstanding about the "optimum" conditions of separator operation. This set of curves would at first glance indicate that the best pressure at which to operate a separator would be at about 1100 pounds. However, it must be remembered that these values are for liquid as measured under separator pressure before a shrinkage factor has been applied. When the shrinkage factors as shown in Figure 3 have been applied, flashing the separator liquid from separator pressure into the stock tank, the residual liquid maximum recovery point shifts markedly downward. For a separator operating at 60° F., the optimum operating pressure appears to be about 600 pounds rather than at 1100 pounds, when the net stock tank

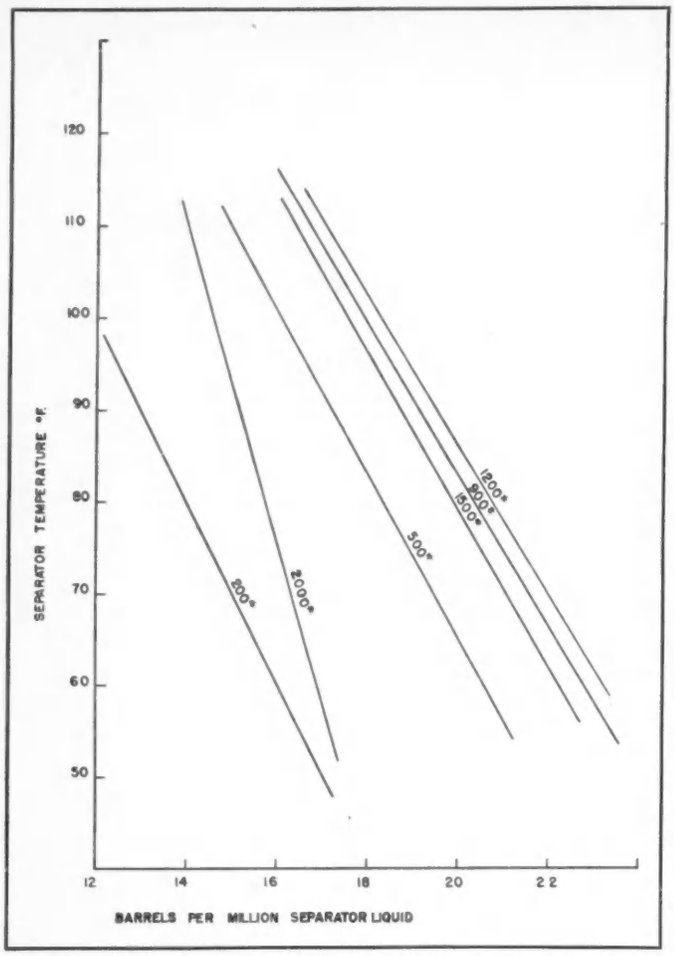

FIGURE 1. Recovery of condensate for constant pressures vs. temperature.

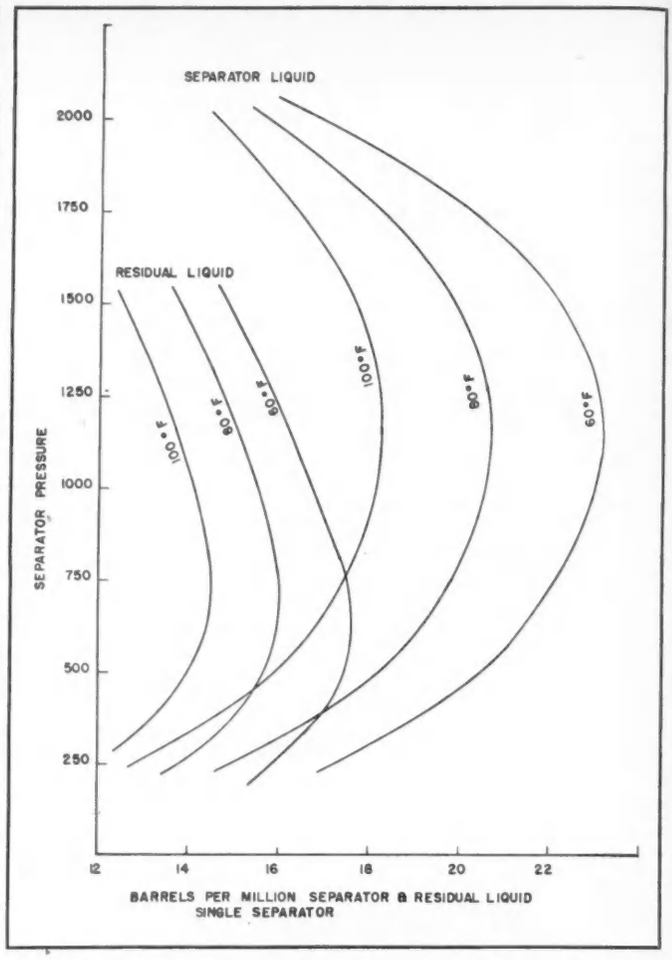

FIGURE 2. Recovery of condensate for constant temperature vs. pressure.

liquid is considered. This is due to the increasing shrinkage loss with higher pressures.

If the liquid accumulated in the high pressure separator is staged through an additional separator to the stock tank, this shrinkage loss can be reduced so that a greater net recovery of liquid from the separator to the stock tank is obtained. However, it must be realized that stage separation can only reduce the loss of liquid accumulated in the high pressure separator, and can under no condition increase the liquid accumulation in this separator. Such an increase in liquid accumulation in the high pressure separator can only be brought about by a change in pressure or temperature, and where the separator is operating at the optimum pressure, the only way by which liquid accumulation can be increased is by lowering the separator temperature.

The reduction of separator temperature is simple to accomplish. Typical gas-condensate wells have high well head pressures, and reducing this pressure to separator pressure results in considerable cooling of the gas. This method of cooling is always available, but its use has been prohibited by the most universal of all problems connected with the handling of high pressure gas—the formation of gas hydrates.

It is well known that gas hydrates are formed by the combination of light hydrocarbons with water, the product being a solid material capable of plugging gas lines, fouling separator floats, blocking the action of gas pressure regulators, and an endless variety of bothersome troubles. These solids are not well understood, but the essential thing is either to prevent their formation by removing water from the gas, or minimizing their effect after formation so that they can do no harm.

Formation of Hydrates

Water in the liquid state is necessary for hydrate formation in high pressure gas systems, and if such water is present hydrates may form at temperatures depending upon pressure and the composition of the gas. Figure 4 is a chart indicating the conditions under which hydrates may form, providing sufficient liquid water is present. Inasmuch as all natural gas is saturated with water vapor under formation conditions, the total water content of a gas is fixed by conditions of botton. hole pressure and temperature.

Changes in pressure and temperature of the gas as it leaves the formation and travels up the hole cause some of this water vapor to condense, with the result that the gas stream now has water in both vapor and liquid form. If enough of this water is removed from the gas stream, no hydrate can form regardless of the temperature and pressure of the gas.

The quantity of water that a gas will hold in the vapor state depends upon the pressure and temperature of the gas, and has been rather accurately determined for natural gas. Figure 5 is a chart indicating the saturation point of methane with water vapor over the temperature and pressure range encountered in natural gas field and well systems. A study of this chart will show that the moisture carrying capacity of methane, the principal component of natural gas, increases with increasing temperature and decreases with increasing pressure.

Natural gas can never be free of water vapor, but the absolute quantity can be reduced to a small value by various means. In any project that involves the handling of gas at low temperatures, it is necessary to reduce the water content considerably, and this has been accomplished in two ways. One method that has been widely used is to first heat, and then reduce the pressure on the

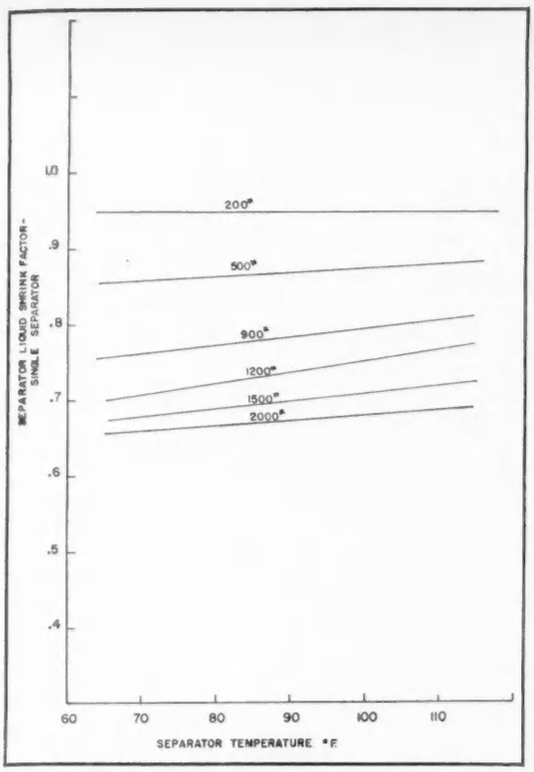

FIGURE 3. Shrinkage factor, separator liquid to tank.

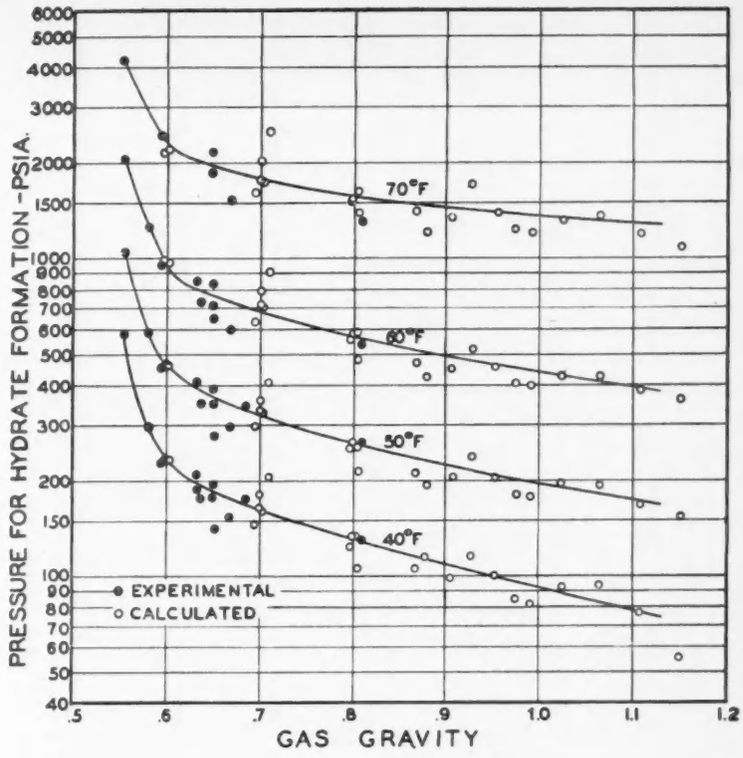

FIGURE 4. Hydrate pressure-temperature relations as a function of gas gravity. (From: T. P. 1748, "Prediction of Conditions for Hydrate Formation in Natural Gases," by Donald L. Katz, Pet. Tech., July, 1944.)

gas from the well head, separate liquids from the gas, and contact the tail gas with a desiccant to absorb some of the water still carried by the gas in the vapor phase. The other method in use is to cool the gas at well head pressure and remove the liquid water at this point, then reduce the pressure. This mechanical removal of water cannot reduce the absolute water content of a gas to that of a desiccant type dryer; but for many purposes, sufficient water is removed to prevent the formation of hydrates in the system.

For an example, consider a typical gas-condensate well with a bottom hole pressure of 4000 pounds and a temperature of 250° F. Under these conditions of temperature and pressure, the gas will carry 70 gallons of water vapor per million standard cubic feet of gas. The well head pressure will be about 3500 pounds. If the gas is cooled to 80° F. at 3500 pounds pressure and passed through a water knockout operating under these conditions, slightly more than 68 of the 70 gallons of water present will be removed; with only 1.9 gallons of water vapor being carried over as vapor. These values are as read from Figure 5, which shows the water vapor carrying capacity under saturated conditions. Thus, the difference in vapor carrying conditions at bottom and top hole conditions represents water condensation which may be caught in a mechanical separator.

If this 3500-pound gas with a total water content of 1.9 gallons per million is expanded to a separator pressure of 500 pounds and sufficient heat is supplied to maintain the temperature at 80° F., the gas can carry seven gallons of water per million as vapor if the water is there for it to pick up. However, the total water present is only 1.9 gallons, so the gas is under-saturated, which means that it can be cooled below 80° F. before any water will condense. Figure 5 indicates that the temperature may be lowered to 42° F. at 500 pounds before the dew point is reached; above this temperature, no hydrate trouble can possibly occur.

It will be noticed in Figure 5 that as the water content decreases to low values that the quantity of water condensed for a given temperature reduction increment becomes smaller. Thus, when the total water content of a gas is reduced to about two gallons per million, further cooling cannot cause other than a small quantity of water to condense, and experiments with gas thus processed have led to interesting results.

Difference in Hydrates

There appears to be a basic difference in the hydrates that form from gas containing a small quantity of liquid water, if they do form under such conditions, and those that form from a gas produced from a well and still containing all of the water brought from the formation. During the past several years, numerous tests have been made wherein a free water knockout was used to remove liquid water at well head pressure, and the gas expanded into a field separator. It was determined experimentally by long tests that under such conditions the normal hydrate formation temperature may be ignored, even though the water content data indicates that there is liquid water present in the separator. Sustained operation of separators and gas systems at 20 to 30 degrees below the normal hydrate point is now common; if the water knockout is bypassed so as to let the full amount of water from the well carry over into the low temperature section of the system, freezing is immediate and complete.

The development of a high pressure free water knockout was first undertaken with the objective of preventing field line systems from freezing, simply by removing the bulk of water from the gas. After a reliable free water knockout had been developed, attention was turned to the lowering of separator temperatures to increase the yield of condensate.

The effect of separator temperature on the yield of liquid has long been known, but gas control equipment such as had been available prevented full scale low temperature separation. The conventional high pressure well hookup has consisted of a heater, choke and separator. This system did not remove any water from the gas stream until it reached the separator. Therefore, all the water was still in the gas when it went

through the separator and there was no choice but to maintain the separator well above the hydrate formation point to prevent freezing troubles. In cold weather, the normal reasoning was to carry the separator as hot as possible to insure against freezing, which actually is exactly the wrong thing to do.

Reference to Figure 5 will show the fallacy of a hot separator to prevent freezing in a gas system. For example, suppose the separator is operating at 500 pounds, and the temperature is carried at 100° F., the gas at this temperature and pressure will carry 12.5 gallons of water per million as vapor in the tail gas; as this gas goes down the line and cools, liquid water will condense in the line in appreciable quantities, and hydrate formation is likely to occur.

Regarding the recovery of liquid in the stock tank, Figure 2 shows what would result in this particular well. With the separator at 500 pounds and 60° F., stock tank liquid recovery would be 17.4 barrels per million; at 100° F., this recovery would drop to 14 barrels per million.

The development of a free water knockout for high pressures has permitted the removal of free water ahead of the point of pressure reduction and separation, which is the logical place for water removal. In gas systems where desiccant type dehydration is used, the gas is first reduced in pressure and separated, then the tail gas from the separator is dried. This dried gas can then be cooled to low temperatures, but the liquid separation has already been accomplished in the separator ahead of the dehydrator and the gas is now at line pressure. Thus, the increased recovery possible in a low temperature separator is lost. The high pressure water knockout opens an entirely new field for development in low temperature separation of gas-condensate.

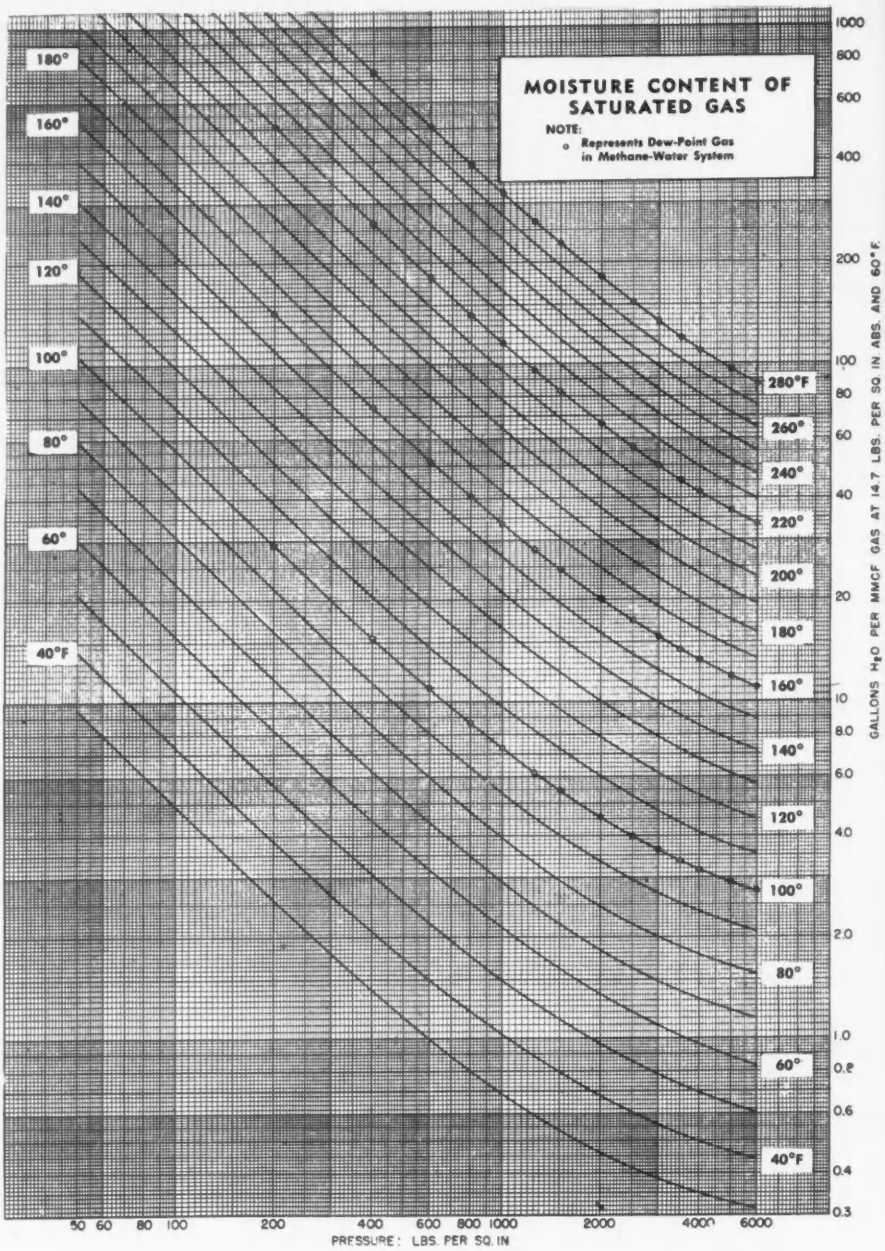

FIGURE 5

As operating separator temperatures were carried to very low levels in some installations, the need for another element in the system became apparent. That was the need for a means for heating the liquid accumulating in the cold separator. Some of the condensates encountered have waxy materials in the heavier ends, and these materials may congeal at temperatures existing in the separator. The actual weight of the condensed liquid is small in comparison to the weight of the total stream flowing; so the heat requirement for this liquid is not great when compared to the heat required to warm the total stream.

It is necessary to limit this heating only to the liquid; if the gas is warmed in passing through the separator, both water and hydrocarbons will be picked up by the gas and much of the advantage of the process will be lost. Obviously, if all materials passing through the separator were warmed to 60° F. and the separator were at 500 pounds pressure, the net result would be exactly the same as that in the example used above: there would be no net gain in liquid recovery, and the tail gas would be saturated with water vapor at these conditions, if the water were available. For this purpose, a special separator was developed, with two distinct sections. The upper section consists of a gas-liquid separation unit, wherein the gas passes through without appreciable change in temperature. The liquid is stripped out of the gas, and drops down to the lower chamber which contains the heating element. With this unit, it is thus possible for gas to pass through the stripping section at a low temperature which results in virtually drying the gas of both liquid hydrocarbon and water; the liquid drops down to the lower section where it is heated to about 70 to 80° F. This heating prevents any slushy material from accumulating and has a stabilizing action on the liquid before it is dumped to the stock tank.

The source of heat for the liquid is the high pressure stream of gas from the well. Before pressure reduction, the gas from the well head is hot, relative to the temperature obtained in the separator after expansion. Thus, by passing this hot high pressure gas through a heat exchanger in the liquid accumulated in the separator, sufficient exchange of heat is accomplished to maintain the desired liquid temperature. The high pressure gas is cooled somewhat in the exchange and then goes through the

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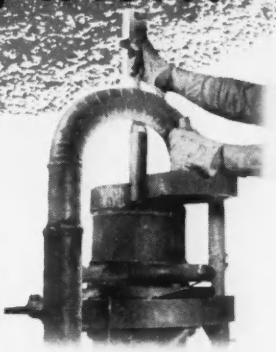

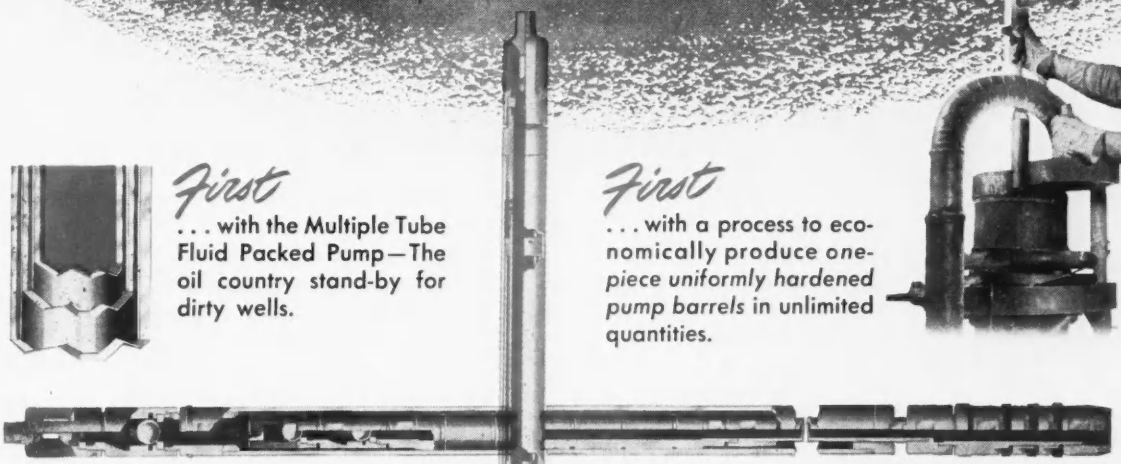

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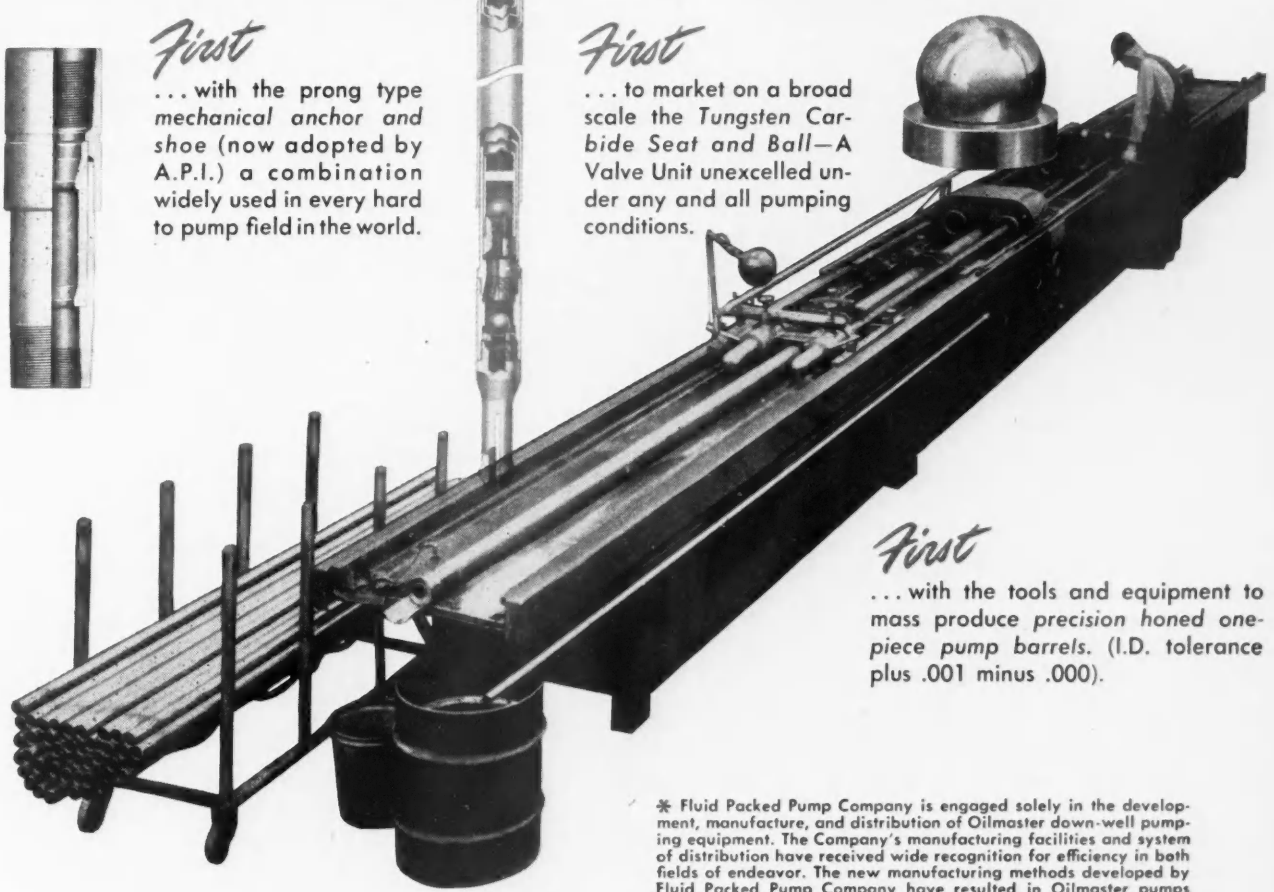

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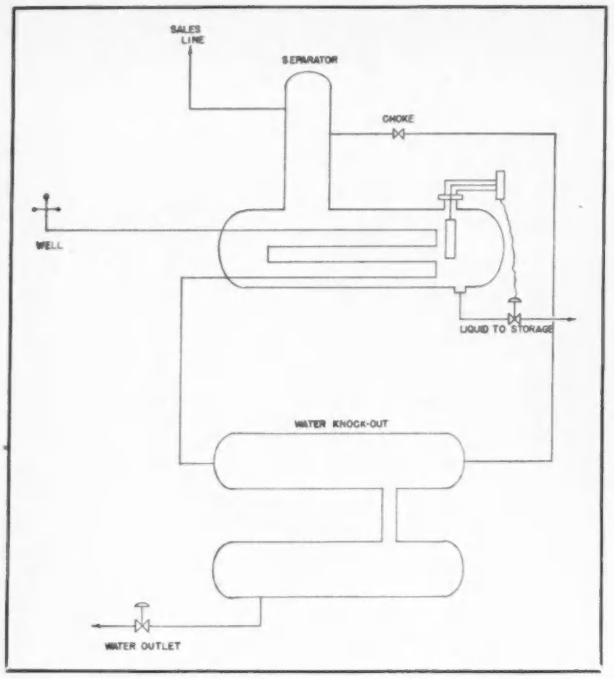

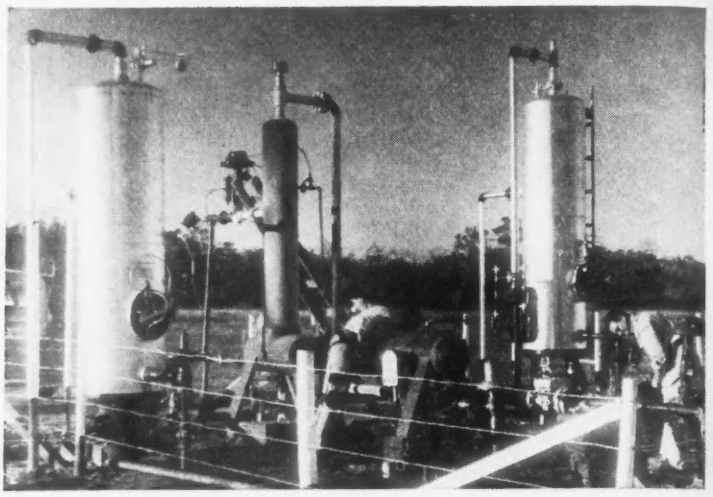

FIGURE 6 (left). Schematic diagram of water knockout and condensate recovery system.

FIGURE 7 (right). Field installation of original equipment by Superior Oil Company.

water knockout. This aids in the removal of water prior to expansion through the choke.

A schematic diagram of the unit is shown in Figure 6. Figure 7 is a picture of one of the first installations of this process. It was fabricated in the company welding shop, and was installed on a Superior Oil Company lease in Southwest Texas. This unit has given satisfactory service since installation, and data obtained from its operation were valuable in the design of subsequent units. The equipment is now built as a unitized package with all piping and controls installed and tested in the shop. Such a standard unit is illustrated in Figure 8.

Use of these packaged units has resulted in a considerable saving of time and expense in the hooking up of high pressure gas-condensate wells. Instead of setting the conventional indirect heater at a distance from the well head and the separator and tanks a like distance from the heater, all parts of the equipment being connected by high pressure piping, the unitized equipment is set on the ground as near the well as desired. Inlet and outlet lines are connected, and gas production can be started immediately.

Results of the operation of these units have been encouraging. Other things being equal, the saving in gas used to fire a heater over a period of time is a sizable item, and there is the added safety feature of complete elimination of a fire adjacent to high pressure gas equipment. The increase in liquid recovery in the stock tank from the gas processed makes an installation a revenue producer rather than an added expense of operation. Data from some of the installations are tabulated in Figure 9. The liquid recoveries shown are based on pipe line runs after weathering of the liquid has occurred. As the gas leaving the separator has a dew point equal to the separator temperature where sufficient pressure drop is available from well head to separator pressure, gas of a dryness comparable to that processed by a desiccant dehydrator is delivered to the pipe line.

There is considerable work yet to be done in the evaluation of results obtained by this process. The action inside the low temperature separator is rather interesting. The total stream from the well enters the separator section at a low temperature and condenses vapors rising from the warm liquid in the warming section. Thus we have a liquid and vapor in the same vessel, each at a different temperature, with some variety of refluxing action taking place in the boundary zone. Such a condition will doubtless lead to interesting calculations.

The question that immediately arises is that of the composition of liquid in the stock tank. Is this liquid composed mostly of light materials that will vaporize to the extent that most of the gain will be nullified? To date there have been no hydrocarbon analyses run on that liquid from one of the units, but there have been shrinkage tests on field storage. In one instance where a tank of liquid was left standing for 24 hours with the hatch open, less than 1 percent was lost. However, this is not too remarkable as the tail gas from a typical field separator of gas-condensate will probably contain one-half gallon pentanes and heavier material per 1000 cubic feet, and this is rather stable material when reduced to liquid. If a separator operates on material from a well with the tank liquid yield 20 barrels per mil-

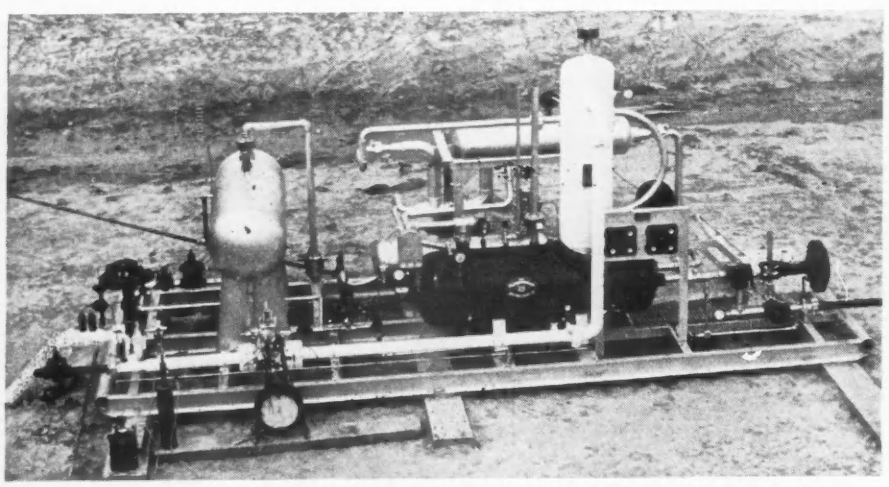

FIGURE 8. Modern water knockout and condensate recovery system skid mounted as packaged unit for simplified field installation.

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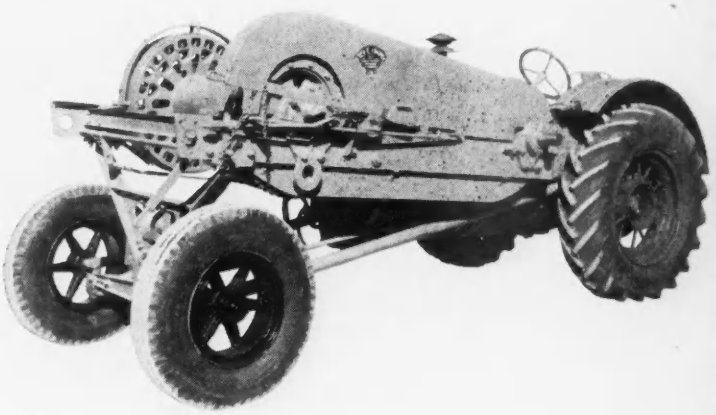

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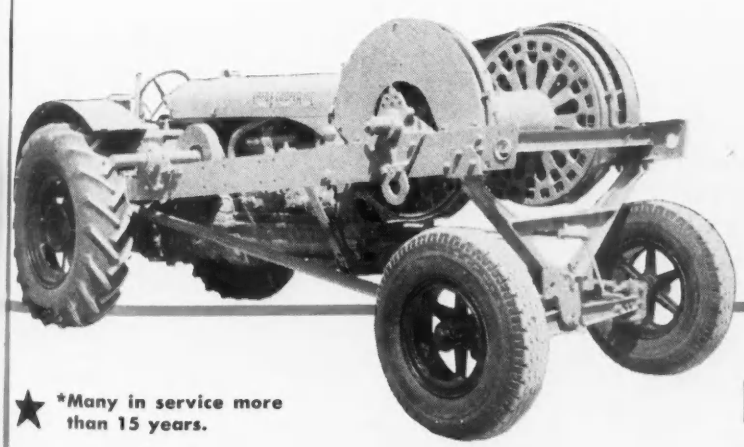

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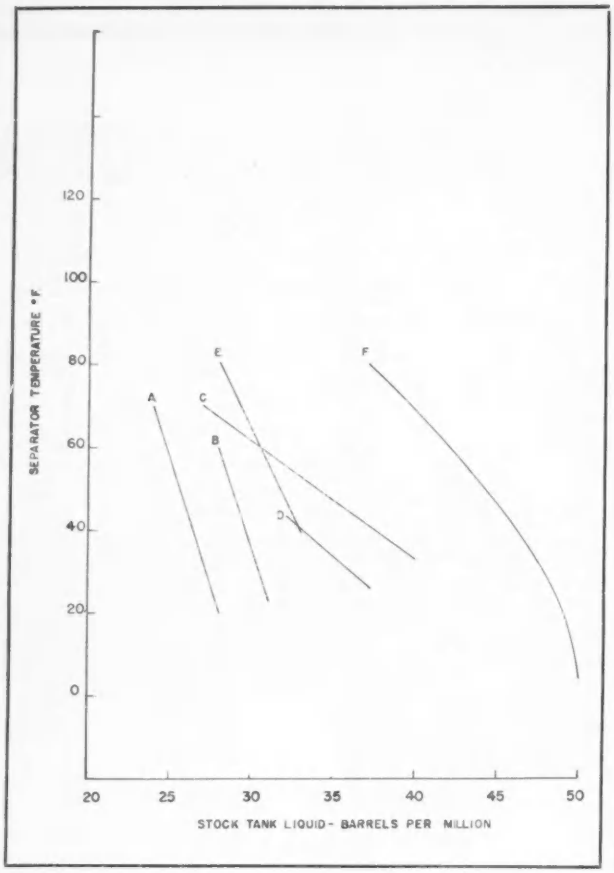

FIGURE 9. Curves A to F represent condensate recoveries from six different wells vs. separator temperature.

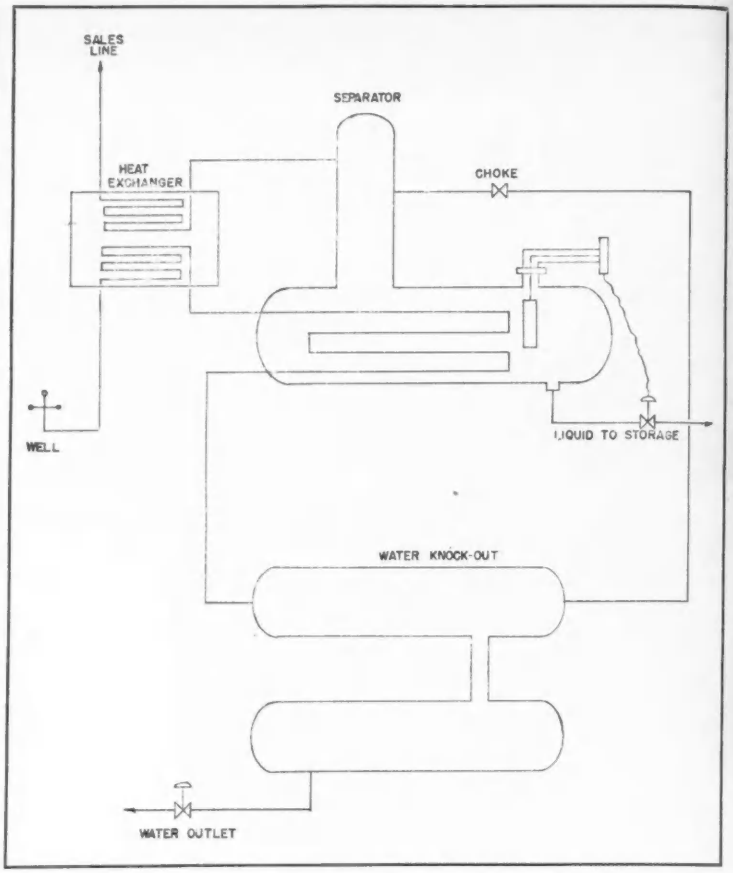

FIGURE 10. Schematic diagram of water knockout and condensate recovery unit equipped with heat exchanger to lower input fluid temperatures.

lion, and the tail gas contains .5 gallon per thousand cubic feet of pentanes and heavier, and it is possible to recover all of the pentanes and heavier from the tail gas in the tank in addition to the 20 barrels, then the additional liquid recovery per million feet of gas would be about 12 barrels. The addition of 12 barrels to the 20 raises the gravity but a few degrees, inasmuch as the liquids would not be too different in composition.

There will undoubtedly be more of the lighter material in a tank of liquid from a cold separator than in the liquid from a hotter one, but considerable butanes may be added to a typical condensate before the vapor pressure becomes excessive. Ordinarily, most of the total butanes and heavier material are separated from a gas-condensate stream and stored in an atmospheric pressure tank without appreciable loss until the tank temperature exceeds 80° F. In some instances, the storage temperatures will exceed this value, but in a majority of cases, the refrigeration obtained by the expansion of the separator liquid to atmospheric pressure serves to keep the tank temperature down.

Temperature control of the gas from the well is a problem. At high flow rates, the gas reaches the surface at a relatively high temperature. This heat is not desirable either from the standpoint of efficient water removal in the knockout, or for maximum cooling of gas in the separator upon expansion. In some instances, a heat exchanger has been used to exchange heat between the cold separator tail gas and the warm incoming high pressure gas from the well. The net temperature in the water knockout and separator depends upon the efficiency of this heat exchange, but in any event the temperature of the gas delivered to the pipe line will be the same, regardless of what the intermediate temperature in the separator may be. The calculation of temperatures at the various points in such a system presents a neat problem for mathematicians. The gas cools itself to a degree dependent upon the amount of heat transfer, and the heat transfer depends upon the amount of cooling. No heat is added or subtracted in the process. Figure 10 illustrates such a cycle.

While the present process was developed for use on isolated gas wells feeding pipe lines, there are other interesting applications that may be considered. With sufficient cooling, the tail gas from a cold separator may approach in dryness the residue gas from an absorption gasoline plant. This means that the recoverable liquid hydrocarbons are in the high pressure cold liquid in the separator, which liquid needs only to be put through a stabilization process to remove material not wanted in the final liquid product. Thus, it may be feasible in some cases to process high pressure gas from wells through cold separators, deliver the gas directly to its destination, and bring the high pressure liquid into a stabilization plant. The over-all economics of such a program as compared to the installation of a conventional absorption plant would be the determining factor, where the additional liquid recovery by absorption would balance against the cost of absorption equipment. There is another factor in favor of the cold separator system, and that is that the residue gas is usually dried to the extent that it is well below the moisture content limit set by gas transmission systems, and no dehydration equipment is required.

Several years of intensive development work have gone into this apparatus to bring it to the present state of efficiency, and most of this work has been of a mechanical nature. As in many problems involving oil field equipment, the development of the actual mechanics has been a greater problem than the development of the theory. The process represents a combination of known principles in a new arrangement, with the development of the individual parts to operate at the extremely high pressures and low temperatures that are encountered.

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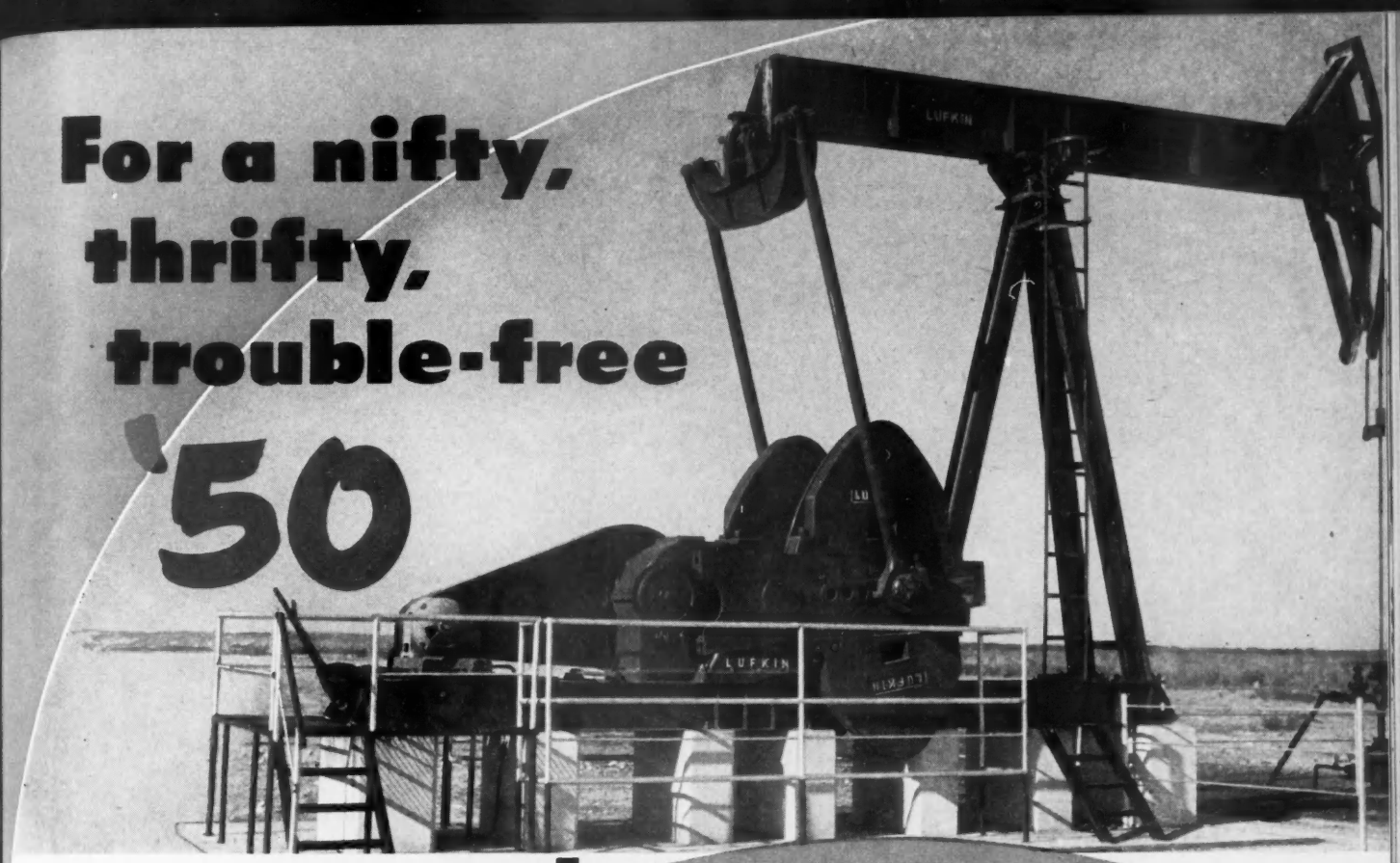

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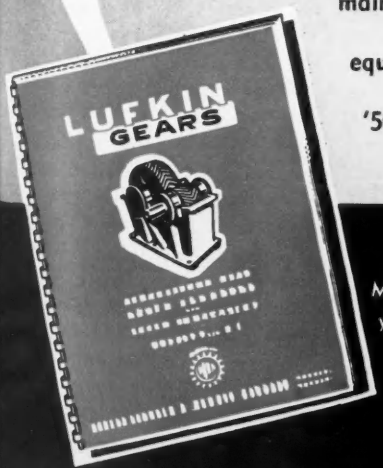

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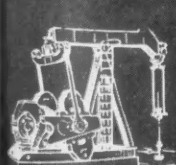
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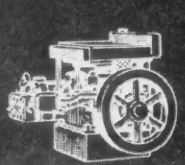
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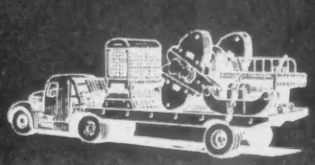
LUFKIN OIL FIELD AND INDUSTRIAL

INDUSTRIAL SPEED REDUCERS

The Mechanism of Air-Gas Drive

Part 1

By D. E. MENZIE and R. F. NIELSEN
Division of Petroleum and Natural Gas Engineering, The Pennsylvania State College

THERE IS widespread difference of opinion as to the effect of increased pressure gradients during secondary recovery processes upon the ultimate recovery of oil. In an attempt to clarify this problem the pressure gradient during a series of air drives was varied. A study was made of the air drive mechanism in a consolidated sandstone 100 percent saturated with brine for eight different driving pressures. Saturations were measured by conductivity on separate sections of the core. Volumetric measurements were made of gas and liquid production throughout the runs. Curves are presented to show the production histories and final residual saturation distributions for eight different pressure gradients. The relationship of capillary pressure, irreducible minimum saturation, relative permeabilities, air breakthrough, efficiency factors, and calculated and measured final residual saturations are also discussed. This paper was presented at the Twelfth Annual Conference on Secondary Recovery at The Pennsylvania State College.

AIR or gas drives as secondary recovery processes[1,2] have been in use for years. Some fundamental information has been obtained in the laboratory[3,4,5] and by analysis of field data, but the basic concepts of the mechanism of the process of recovery still are not completely known. The variables of sand properties, oil characteristics, and gas volumes present a complex picture which requires much study and effort. As this information is collected and the results presented to the oil field workers, they in turn can more efficiently produce the oil from the reservoir.

Throughout the oil industry, there is a difference of opinion as to the effect of increased pressure gradients during secondary recovery processes upon ultimate recovery of oil.[6,7,8,9,10] There is no doubt that increasing the driving pressure during a flood will increase the rate of production. This is an advantage when considering the investments of the property and the life of the machinery. The problem of accurately determining whether the residual oil saturation after a flood is reduced when using a high pressure gradient has been investigated both in the laboratory and in the field. The results of these investigations are not in agreement. In an attempt to clarify this problem the variable of change in pressure gradient during a series of air drives has been selected for study. A sample of consolidated sandstone was used as the reservoir rock. All variables except pressure gradient have been controlled and have been held as constant as possible. Previous laboratory investigations of the effect of increased pressure gradients during an air drive have been limited to a relatively small core, to a long core with no exact method of measuring saturations at a given point, or to an unconsolidated sand packed tube. Such approach has not proved satisfactory. By use of a long consolidated sandstone it was hoped that the end effect could be limited to a small percentage of the total volume of the core. By using a consolidated sandstone mounted in lucite a considerable range of absolute pressures could be used. With these added advantages it was hoped that a better study of the effect of pressure gradient upon ultimate recovery could be made.

The sample of Cow Run sandstone which had been used previously was extracted with solvents using a large Soxhlet. Methanol and naphtha were used as the solvents. After extraction, the ends of the core were removed to square the core and to reduce the total length to facilitate mounting in lucite. Plug cores were later obtained from the end sections cut from the long core. After the core was extracted, and cut to length, it was placed in an oven and heated to not more than 100° C. This drying process removed all the solvent from the core. After cooling the core the gold-plated strip brass electrodes were placed at the various positions. The 1.5 x 0.5 x 0.002-inch strips of metal were cemented on the side of the core with a baked resin. The positions of the electrodes were staggered so as to obtain the best possible electrical readings. The resin was allowed to dry for several days. The core was then centered in a large mold and powdered lucite placed around it. After heat and pressure were applied to the lucite, ($T = 135°$ C, $P = 4000$ pounds per square inch), a plastic coating was formed around the core. Upon removal from the mold the plastic was found to have bonded with the core at all places except at the electrodes. A diamond saw was used to remove the lucite plugs at each end of the core, which had been formed in the mounting process. Holes ¼-inch in diameter were drilled and tapped into each electrode. At 90 degrees from each resistivity tap similar openings were also drilled through the lucite and just touching the surface of the core. These were to be used as pressure taps for determining permeability of various sections of the core.

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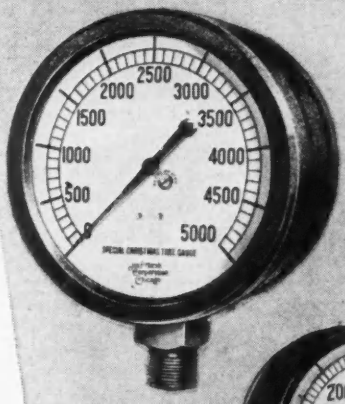

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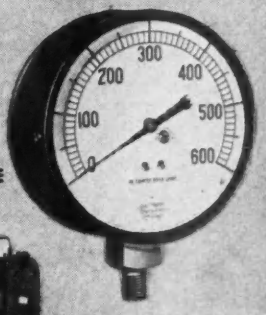

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This was to remove any salts which might be present. The core was then driven with air until a constant weight was obtained. This was considered the dry weight of the core. After air was forced through the core it was found that the electrode taps could also be used for pressure readings. The four openings at each measuring point on the core were connected as in a piezometer ring and the average pressure was measured with a manometer. A dry air permeability was then determined on the entire core, and the pressure drop and permeability for each section were also obtained. (Figure 1).

To eliminate production of liquid into the space above the electrodes during a run a fine graphite powder was forced into the opening. A brass plug was then screwed into the lucite through the graphite to the electrode plate on the core. During the runs a fine metal screen was placed in contact with the producing end of the core, thus allowing the measurement of electrical resistivities of the final section of the core. The end plates were machined from lucite sheets and were held firmly in place against the ends of the core by brass tie-rods.

The plug cores drilled from the discarded ends of the original core were mounted in lucite. Permeabilities and porosities were determined on each plug. The plug obtained from the end of the original core labeled North has been designated as N and was found to be of very low permeability. This plug was not considered typical of the long core. There is no apparent explanation for the low permeability of the plug core, since the long core was found to be fairly uniform with respect to the permeabilities of the sections. Plug core S was taken from the other end of the original core and was used for the determination of capillary pressure. Its permeability was more in agreement with the permeability of the entire long core.

A lucite reservoir was used during the saturating procedures to avoid the contamination of the brine that would result from a metal container. A similar lucite container was used as an air saturator at the input end of the core. The input air was passed through this reservoir of water prior to entering the core. This was to reduce to a minimum the evaporation of liquid from the core during the experiments.

A 100 cc burette sealed at the bottom and containing a side arm connection at the top was used to collect the liquid produced from the core during the runs. The air produced during the runs passed from the burette to a wet test meter where it was measured. A variable capacitance box and conductivity bridge was used to determine brine saturations during the tests.

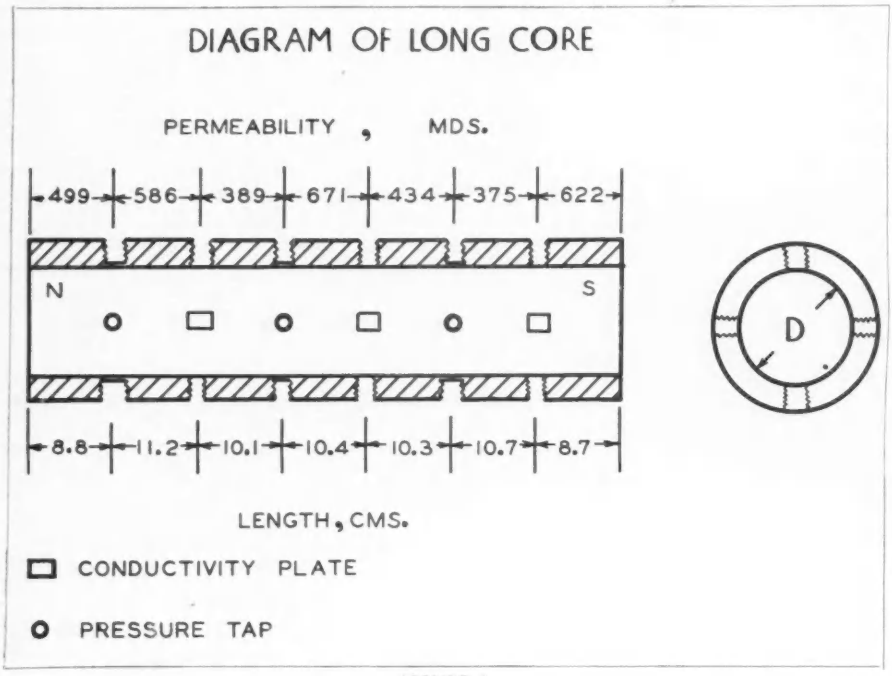

FIGURE 1

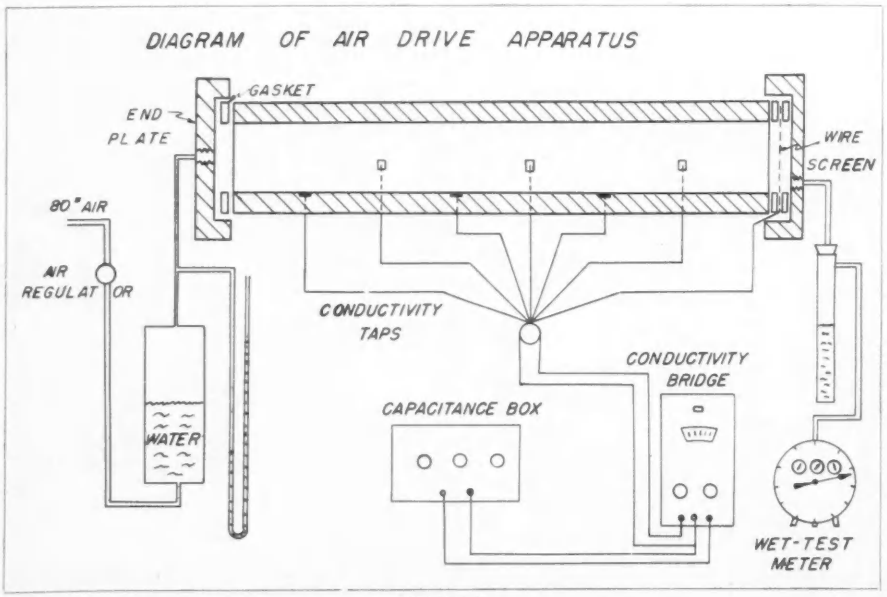

FIGURE 2

Experimental Procedure

The cores were saturated with 0.2N brine by evacuating from one end until an absolute pressure of not more than a few millimeters of mercury was obtained at the other end of the core. Deaereated brine was then forced into the end of the core under an 80-pound per square inch pressure. A vacuum was held on the down stream end of the core until liquid was produced. Brine was always forced through the core until at least one pore volume of liquid was produced. All connections were of Saran tubing to prevent formation of corrosion particles in the liquid.

After the long core was saturated with brine, weighed, and placed in a constant temperature unit, the various electrical measuring devices and pressure gauges or manometers were connected to the core (See Figure 2). The completely brine saturated weights were found to check very closely from run to run. Saturations were measured by a conductivity bridge. A switching arrangement was used so that measurements could be performed on any two corresponding sets of electrodes. Before the experiment was started the resistance of each section was determined. This gave the 100 percent saturated-electrical resistivity on which were based the relative resistivities used to determine saturations. The 80-pound air supply was reduced to the required pressure by means of a sensitive regulator. The air used for all runs was passed through the saturator containing brine of the same composition as that used in the core. The produced liquid was collected in a 100 cc

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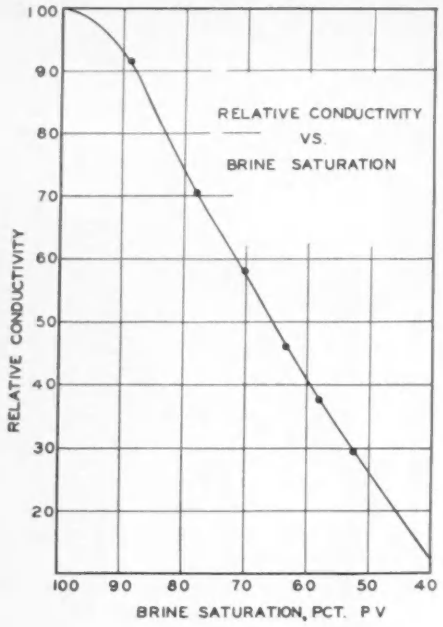


FIGURE 3

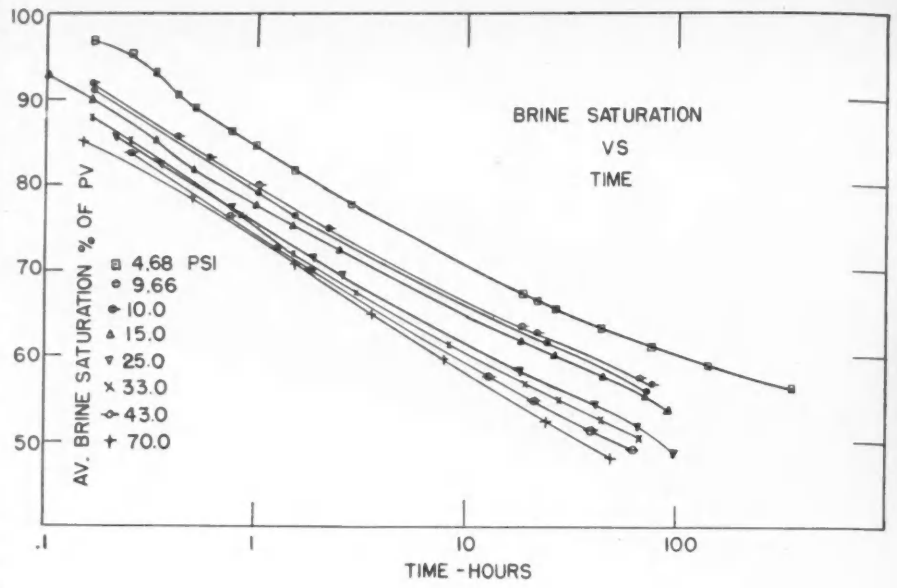


FIGURE 4

burette with .2 cc scale divisions. Air volumes were measured by a wet test meter with .001 cu. ft. scale divisions. Pressures, saturations, liquid produced, air volumes, and times, were recorded during each run. At the end of each run the core was weighed to supply information for an over-all material balance on the core and to determine the evaporation losses during the run.

The capillary pressure-saturation data on the long core was obtained by use of a talc membrane placed at the producing end of the core.

The calibration curve of percent relative conductivity versus percent brine saturation, Figure 3, was obtained by the following method: After the long core was completely saturated with brine, an air pressure was applied to the core until a given amount of liquid was produced. The air supply was then changed to the producing end of the core. Air was introduced at the producing end and a reversal of flow of liquid resulted. This backflow of air was to reduce the pile-up of liquid which is known to accumulate at the outlet end of a core during a drive.

To indicate when this pile-up of liquid had been removed, a flow meter was placed at the input end of the core. Air was forced through the core until a maximum rate of flow of air was obtained as shown on the flow meter. The end effect of the original air drive was eliminated by this reversal of flow and a fairly uniform liquid saturation was obtained throughout the core. The electrical resistivity readings were then recorded and these supply the basic data for a relative conductivity curve. The core was then removed from the constant temperature unit and accurately weighed. The average saturation was obtained from the difference in this weight, and the original dry weight of the core. From the knowledge of the pressure drop during the above procedure and the rates of flow of air it was possible to obtain the curve of relative permeability to air as a function of brine saturation.

Air Drives

Shown graphically in Figure 4 are the production histories of a series of air drives in which eight different driving pressures were applied.

Figure 4 is a plot of the average saturation in the core (based on volumes of brine actually recovered from the core) against the driving time in hours for each of the different pressures. The curves in general show a straight line relationship on the semi-log paper. It will be noted that the curves fall, as is expected, in the reverse order of their applied pressures. That is, the low pressure run of 4.68 pounds per square inch required the most time to reduce the core to a given saturation. It will also be noted from the curves that two runs were performed at approximately ten pounds per square inch pressure. This was to determine the accuracy with which it was possible to duplicate two succeeding runs. The points for the original run and the check run fall very nearly on a common line. In general the difference in saturations appears to be approximately 1 percent at any given time during the drive.

Figure 5 is a series of curves showing the history of each section of the test

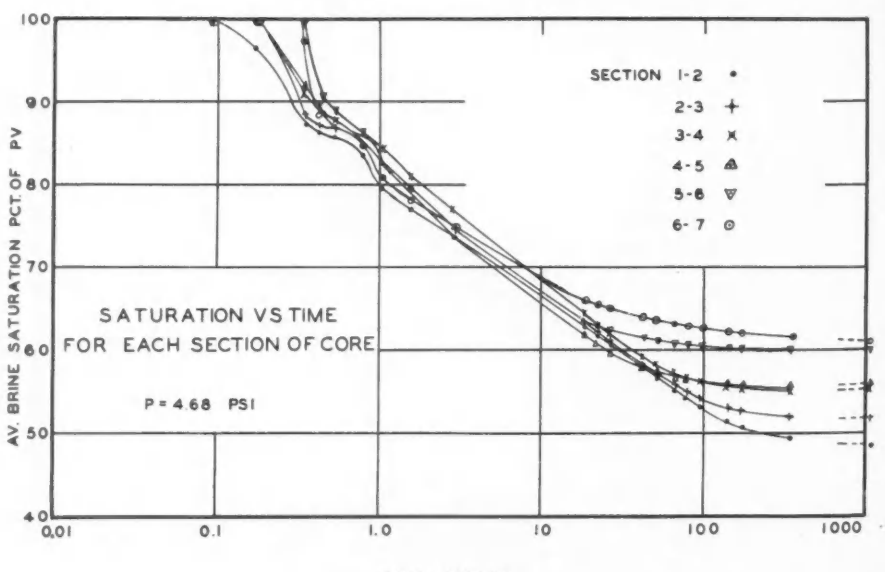
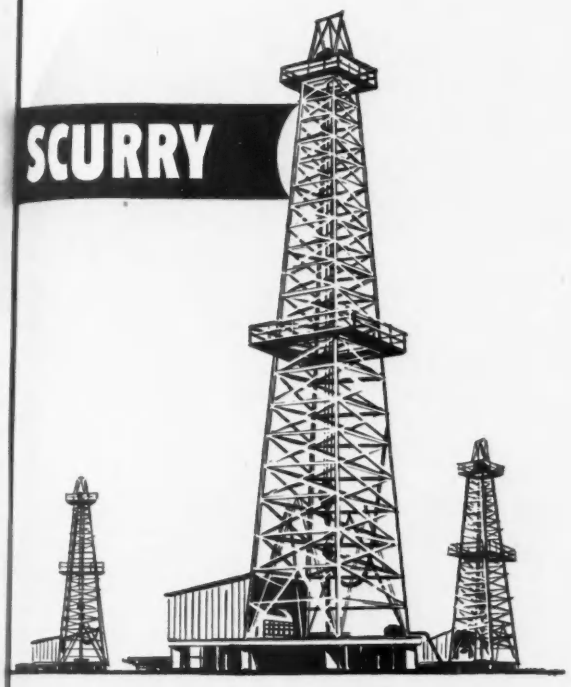


FIGURE 5



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core during the 4.68 pounds per square inch air drive. This curve is one of the most comprehensive curves, for it shows the data which identify the saturation at a point in the core at any time. These are in general the data needed to correlate the variables involved in a drive. It will be noted from the curves in Figure 5 that the general trend is toward a straight line on the semi-log paper, in the range between passing of the front and the final tapering off of production.

The presence of two points of inflection is not without meaning. Consider, for instance, the curve for Section 1-2, the second from the upstream end. When the curve leaves the 100 percent saturation point, the front has entered that section. The curve is then regulated by the constant rate of brine recovery prior to break-through. This part is concave downward on the semi-log plot. At the first point of inflection or leveling off, the front has passed that section but air has not broken through at the producing end of the core. From the time the front has passed the section until break-through at the end of the core, the pressure gradient and hence the rate of change of saturation in the section is small, since the greater part of the pressure drop in the core is between the front and the producing end. After the air break-through at the producing end the gradient begins to be redistributed so as to give a higher gradient at the upstream end. This produces the second point of inflection, corresponding to an increase in oil production from the section. From then on there is a steady decrease in rate which gives a straight line on semi-log paper up to about 10 hours.

The rate of change of saturation begins to level off first in the producing end section at approximately ten hours. The ultimate saturation or the asymptote which this section tends toward is also higher than that of the curves for the other sections. The reason for this lies in the capillary phenomena which will be discussed subsequently in detail. The leveling off of the curve for the end section is followed by the leveling off of each of the other sections in turn, each tending also in turn toward a lower asymptote. This sequence of events is a consequence of continuity or material balance considerations, relative permeabilities, and pressure gradients, the latter factor being due both to gas flow and capillary pressure, all of which will be discussed later.

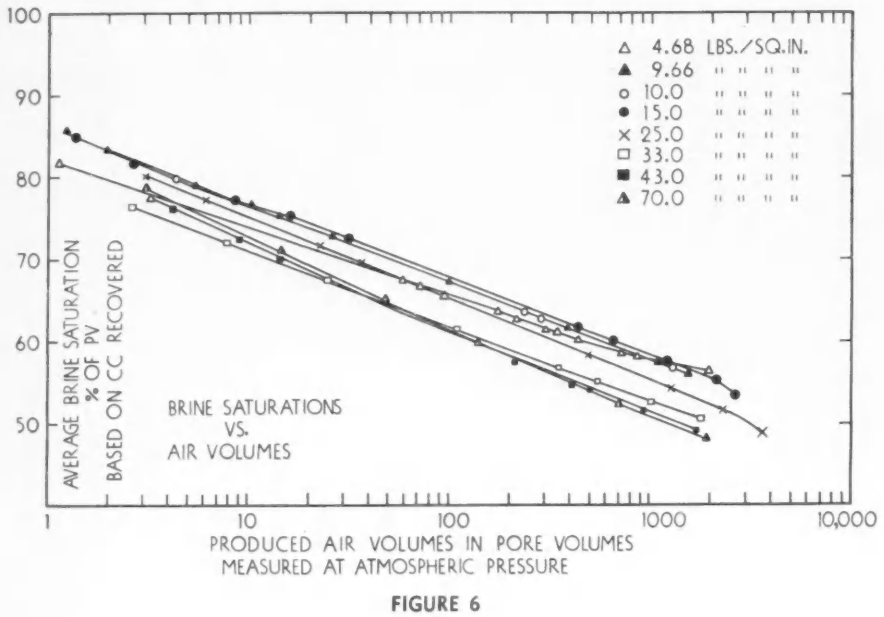


FIGURE 6

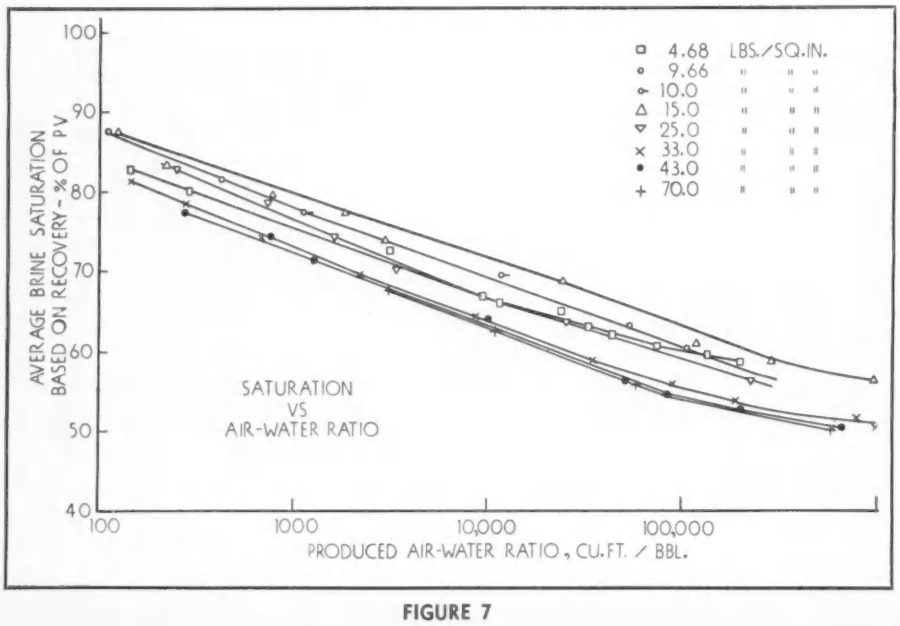


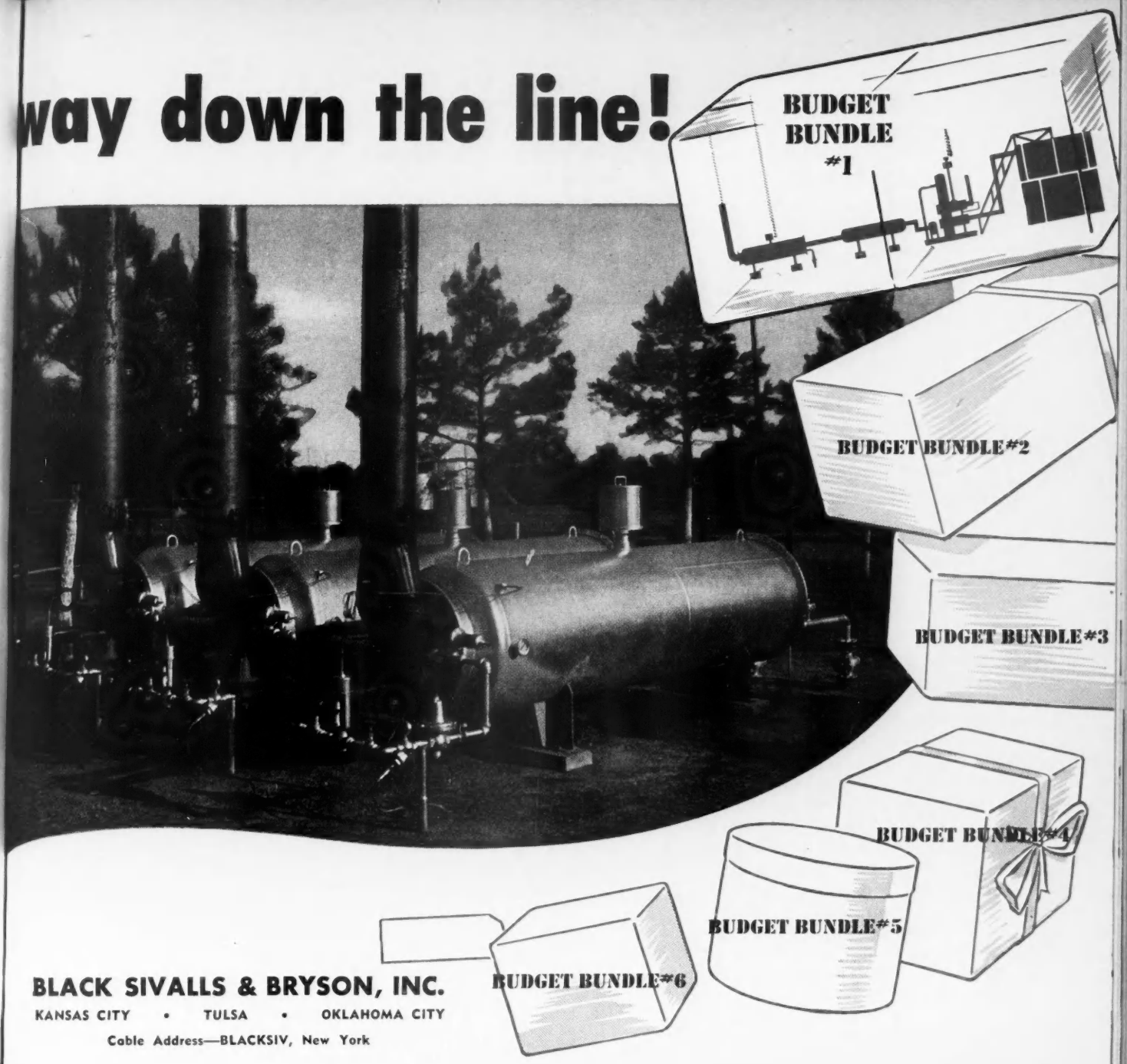
FIGURE 7

Figure 6 is a graph of brine saturations based on recovery of brine from the core against the cumulative air volumes produced from the core. The straight line being formed on semi-log paper for these data has been discussed before by various authors.[7, 11, 12] Although at the higher saturation the curves are in no particular order, when the ends of the runs are reached the residual saturations are in the reverse order of the driving pressures. A correlation of the slopes of the curves (the "M" values as calculated by Day and Yuster,[11] and Muskat[12]), with the pressure gradients imposed during the air drive will give an indication of the efficiency of the drive. Day and Yuster found in their long core experiments a range for "M" values of 2.52 to 4.56 for pressure gradients varying from 0.13 to 3.9 lbs./sq. in./ft. and a range of 0.6 to 2.45 for "M" when several sets of field data had been analyzed. Muskat suggested an "M" value calculated from relative permeability data to be of the order of 5 or more. He also states that the "M" value as calculated from data on a consolidated sandstone as published by Botset is of the order of 3.5. From the data as given on Figure 4 it was found that the slope ("M") values range from 3.69 to 4.78 and averages 4.25. This is much above the average of 1.66 which was found for actual field data by Day and Yuster. The slopes of Figure 4 are given as follows:

Gradient: lbs./sq. in./ft.	"M"
2.03	3.69
4.35	4.04
6.52	4.02
10.82	4.43
14.32	4.78
18.70	4.69
30.40	4.17

The difference in slopes of the curves for laboratory and field data may be due to the higher pressure gradients used in the laboratory, or may be due to the

way down the line!



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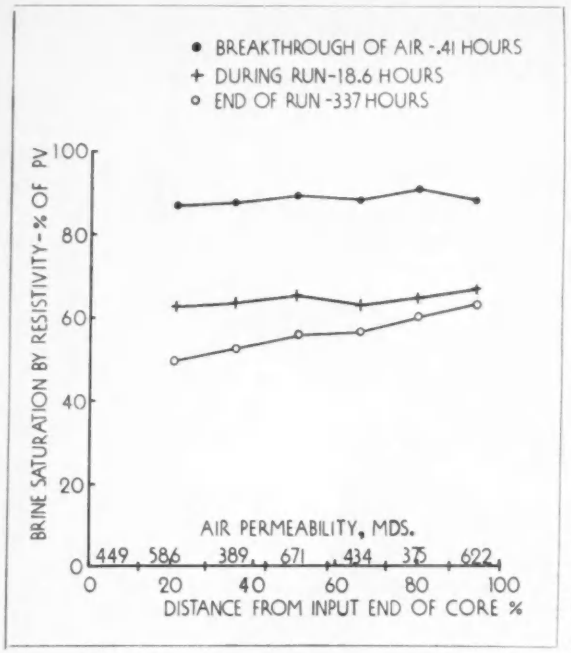
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DISTANCE FROM INPUT END OF CORE %

FIGURE 8. Saturation vs. Distance P = 4.68 pounds per square inch

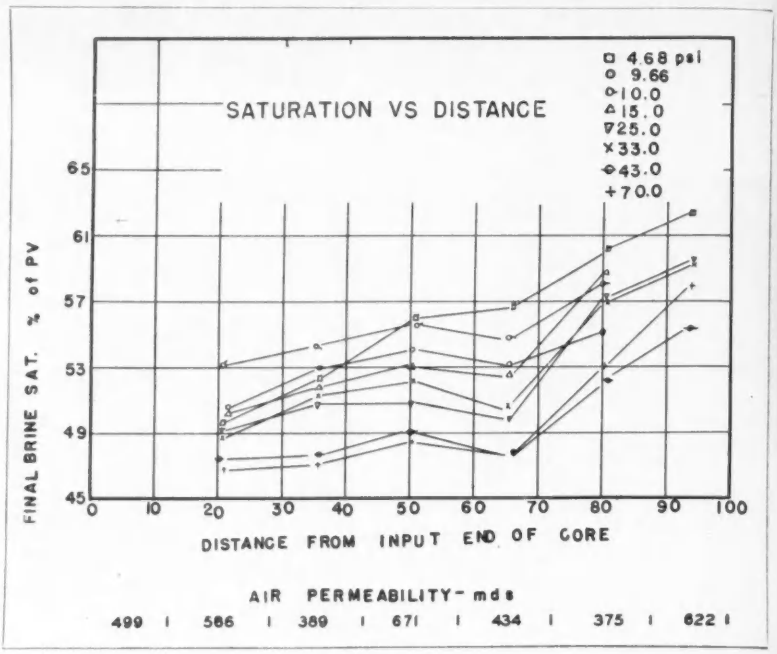


FIGURE 9

many variations in field conditions such as characteristics of the sandstone, by-passing, etc.

An "M" value of 5.2 has been calculated from the slope of the independently determined Relative Permeability Ratio —Saturation curve. This shows close agreement with the corresponding value suggested by Muskat and fair agreement with the average slope obtained from the long core data on Figure 6. It is apparent that little of this variation is due to any sand characteristics of the core for the relative permeability data and the air drive data were obtained from the same core under similar conditions. Perhaps this variation may be due to the effect of increased pressure gradients upon the liquid distribution in the core or due to some continuity effects which are present in the air drive data but not in the relative permeability data. It is at least gratifying to be able to point to agreement of data of air drives on long cores and Relative Permeability-Saturation data within a variation of 4.3 to 5.2.

The curves of Figure 7 show the brine saturation based on recovery of brine and the calculated produced air-water ratios. These curves appear similar to the gas volume curves. The air-water ratios are excessively high compared to field values but this was necessitated by the desire to continue the drives until no liquid was being produced from the core.

Saturation Distributions

The curves shown in Figure 8 are taken from the data of the 4.68 pounds per square inch run as found plotted in Figure 5. The upper curve shows the saturation of each section of the core at air break-through as obtained from a cross plot of Figure 5. This curve shows an approximately even saturation at the time of break-through. This is in accordance with the theory of "equilibrium saturation," for two phase flow in which the non-wetting phase must be present in a certain minimum saturation to allow flow. This has been found in most cores tested to be of the order of 90 to 92 percent saturation of the wetting fluid. The average liquid saturation as shown by the top curve is approximately 89 percent. The center curve shows the saturation of the core at a mid-time during the drive. The saturation is still fairly even, but it can be noted that the section at the producing end of the core is just beginning to have a higher liquid saturation when compared to the other sections. The lower curve shows the final saturation distribution for the core at the end of the air drive. Approximately 13 percent difference exists between the residual liquid saturations at the opposite ends of the core. This difference in saturation involves an appreciable percentage of the total final residual brine saturation for the entire core.

The final saturation distributions for the series of eight different pressures are presented in Figure 9. The curves are a plot of the final residual brine saturation at the end of a run against the distance along the core. A general trend is followed by all the curves within experimental error, namely, the high residual saturations at the producing end of the core and gradually decreasing saturations as the distance from the producing end is increased. The consistently low values at 65 percent of the distance may be due to a peculiarity in sand struc-

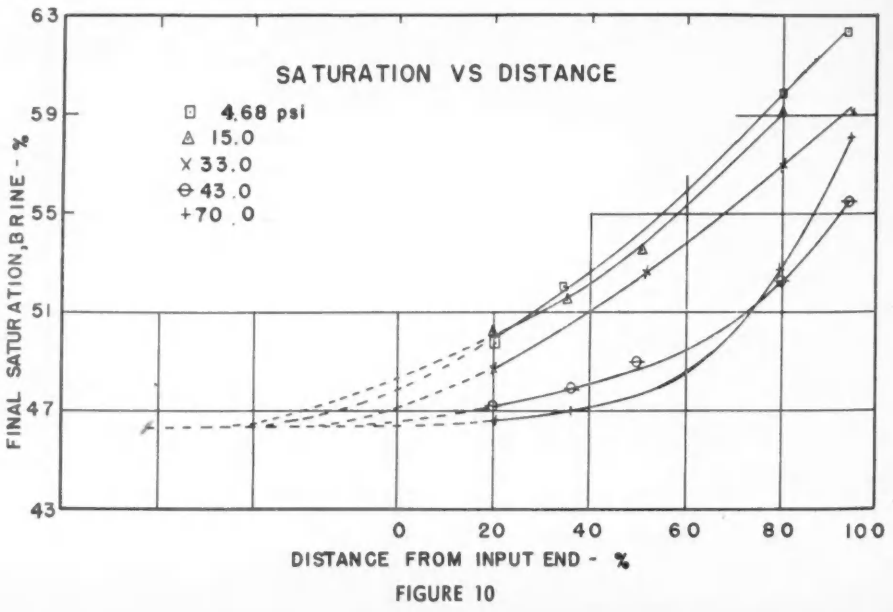
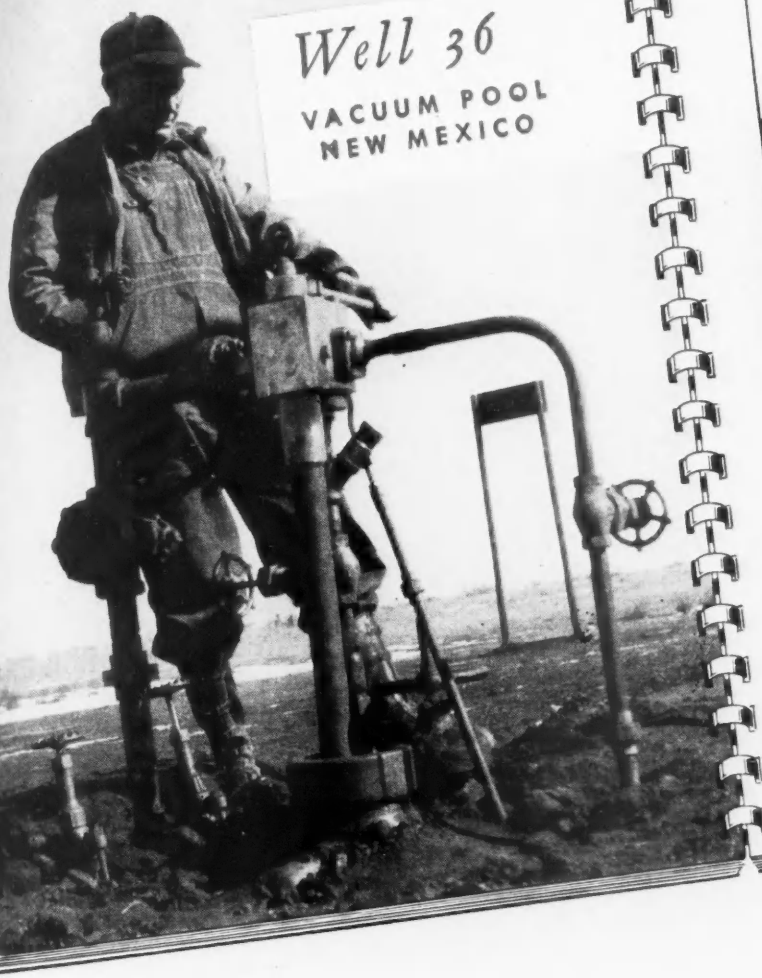


FIGURE 10

Free Pumping
REDUCES PULLING COSTS *98.5%*
ON NEW MEXICO LEASE

CASE HISTORY

Well 36
VACUUM POOL
NEW MEXICO



CASE HISTORY

Comparative Operating Costs

The Vacuum Pool, New Mexico, offers another vivid example of the substantial savings in operating costs made possible by Free Pumping.

Over a 17-months' period the operator kept a detailed report of expenses incurred in pumping five wells on the same lease, operated under practically identical conditions. Four wells were conventionally pumped, and one Free Pumped.

For comparative purposes two sets of cost figures are shown: One for the Free Pumped well, and one for an average of the four conventionally pumped wells. In pulling alone, Free Pumping saved as much as 98.5% compared to the average of the four wells. The savings in the other categories, as shown in the table below and accompanying bar chart, were also impressive.

OPERATING COST DATA

	Avg. Cost of 4 Conventionally Pumped Wells	Well 36 Free Pumped
Period Covered	17 mos.	17 mos.
Pulling Costs (Labor Only)	$ 655.81*	$10.00
Total Paraffin Removal Costs	82.39	13.60
Total Pump Repair Costs	456.19	71.08
TOTAL OPERATING COSTS	$1194.39	$94.68

*Even when compared with the best of the 4 wells, the pulling cost of Well No. 36 was 96% lower.

Operators looking for ways to substantially lower pumping operating cost are turning to Free Pumping.

Because one man alone can surface, change, and run the bottomhole pump, Free Pumping virtually eliminates pump pulling expense and downtime losses.

As shown by the figures above, paraffin control, another big expense in many fields, is reduced to a negligible, low-cost item by Free Pumping.

There are other important advantages of Free Pumping. For every production problem that arises, the Free Pump operator is able to qualify the source and scope of his problem quickly, easily, and at a minimum of expense.

Enjoy flexibility in your producing operations that you have never before experienced by switching now to Free Pumping.

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ture of this section, but there is no conclusive evidence for this. In an attempt to determine better the trend of the curves a series of smooth curves were drawn through the experimental points. These curves are shown for most of the different driving pressures in Figure 10. Keeping in mind that all the curves must have horizontal asymptotes and presumably not cross each other, the smooth curves indicated by the points head rather naturally to the same horizontal asymptote. Thus an extrapolation of the curves show a tendency toward a common limiting saturation of approximately 46 percent brine. This implies that if the core being used were sufficiently long, then the first section would not be affected by the end effect and would be reduced to this 46 percent brine saturation. This will be discussed further in connection with the capillary pressure curve for the sand. The curves of Figure 10 might be interpreted to suggest that the pressure gradient does not affect the ultimate saturation provided the end effect is eliminated. In an attempt to investigate this further, a calculation suggested by Elkins and modified by Terwilliger[13] has been performed based on data obtained from this core. The equation is

$$l = \frac{AK}{76\mu_g Q_a P_a} \int_1^2 K_{rg}(P_c + P_a)dP_c$$

Where

l = distance measured from the outlet end of the core, in cms.

A = cross-sectional area of the core, in sq. cms.

K = permeability of the core, in darcies.

μ_g = viscosity of the air, centipoises.

Q_a = rate of flow of air at the producing end of the core, cc/sec.

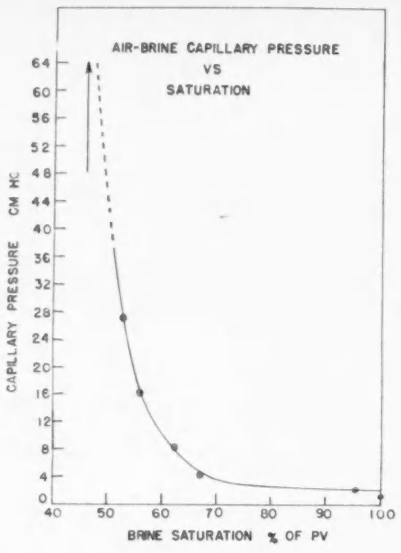

FIGURE 11

P_a = atmospheric pressure, in cm. Hg.

K_{rg} = fractional relative permeability to air.

P_c = capillary pressure, in cm. Hg.

The data for the calculations were taken from Figures 11 and 12. The capillary pressure-saturation data of Figure 11 were obtained by use of water wet semi-permeable membrane at the producing end of the long core. The area under the curve of Figure 12 is a measure of the terms under the integral sign in the equation above. All other values being constant, the distance to a certain saturation can be calculated. The results of this calculation are shown in Figure 13. It will be noted that the maximum variation of the calculated and experimental curves is of the order of 3 percent brine saturation with an average variation of approximately 1 percent. This is of the order of the errors of the saturations as determined experimentally. Thus, for conditions as set forth in these experiments and for the consolidated sandstone used, it appears that the end effect after an air drive may be calculated to within the experimental error of the data used for the calculations.

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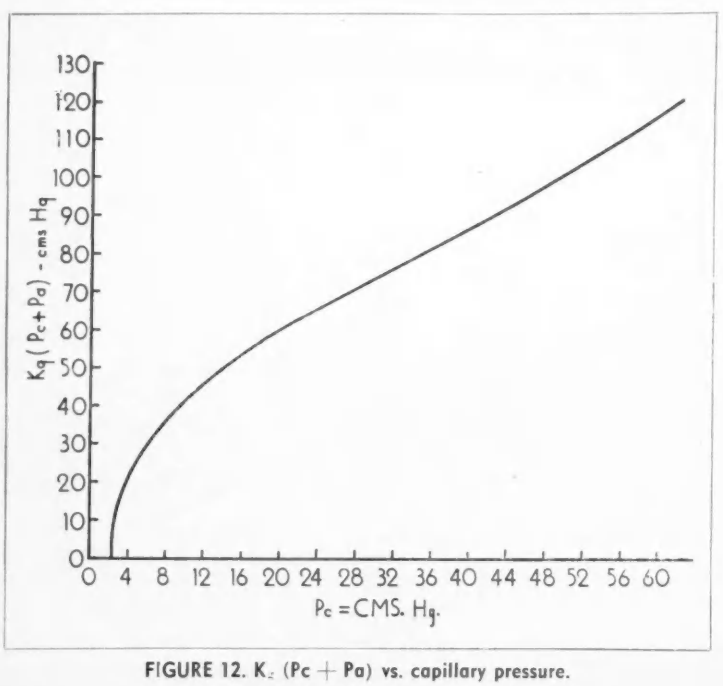


FIGURE 12. K_g ($P_c + P_a$) vs. capillary pressure.

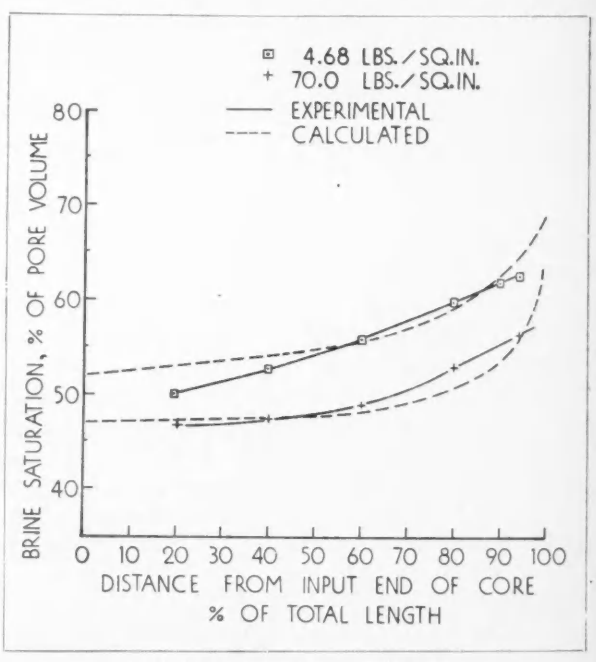
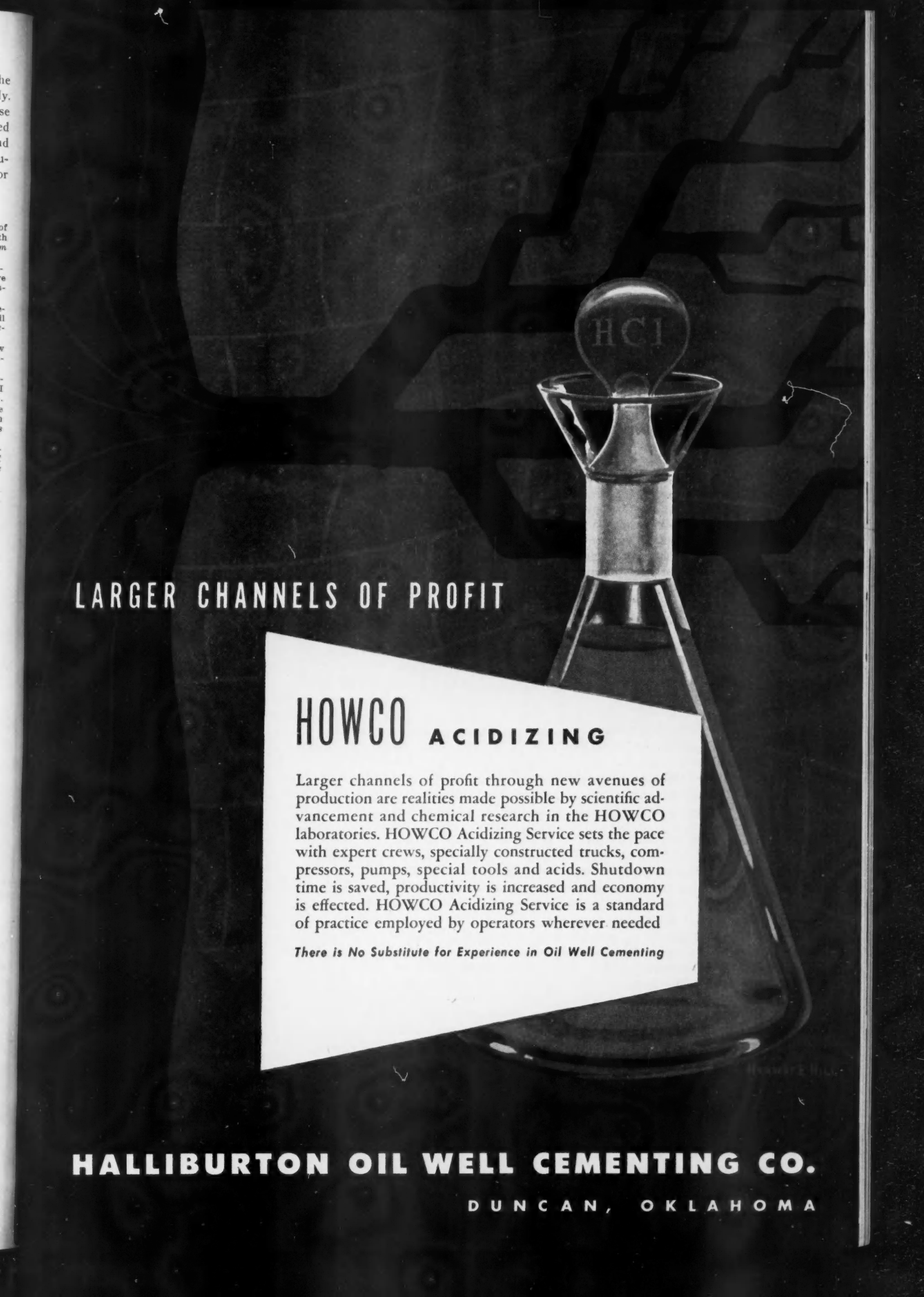


FIGURE 13. Saturation vs. distance.



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Scale Deposit Prevention

In Gas Lift Wells

By R. B. WALTER
Petroleum Engineer, Oklahoma City

USE OF down-the-hole assemblies of zinc and copper to set up galvanic action has been found in some areas to prevent the formation of scale on the pump, tubing and other units of the flow string. The author cites data on wells to demonstrate the extension in producing life between workovers, which may be secured by revising the well setup to accommodate the treaters.

IN SOME areas where oil is produced by the gas-lift method operators face the serious problem of combatting formation of scale or scale deposits which forms within the well itself, on flow lines, on tubing inside and outside, on separator dump valves, and within the settling or flow tank. Many wells produce large volumes of fluid ranging up to 2000 barrels per day and cutting 98 percent water which carries a comparatively high percentage of calcium carbonate and sulfate, two of the more common scale-forming compounds. This scale can form so fast that it is not uncommon for the flow valves in a tubing string to become so badly scaled up that they cease to function in a matter of from two to three weeks after installation. Scale deposits also form rapidly in tubing strings within a week or two after tubing has been rerun following pulling and cleaning, and cut down production appreciably.

Until recently the most common method of combatting scale formation was through the application of acids and other chemical compounds, all of which were temporary expedients at best since the acid does not remove all the scale from the tubing and flow valves. More effective, but also more costly, is the method of pulling and cleaning tubing which in turn involves a loss of production.

Production and research men have studied mechanical methods for combatting scale formation and have known that if a fluid could dissolve enough zinc so that it could become present in the fluid in the ionized state, it could not only prevent formation of scale but could also remove such scale as had already been formed.

A zinc treater which can be installed at the bottom of a well has been designed and is finding successful application in combatting scale formation problems. The treater consists of a series of alternate copper and zinc discs strung on a steel rod. The series of discs begins and ends with a copper disc with copper and zinc discs separated by means of brass spacer rings. The entire assembly is drawn together and held by nuts screwed onto each end of the rod.

A successful zinc treater installation is one where the fluid treated dissolves or ionizes a sufficient quantity of zinc to render scale forming material inert and to remove gradually accumulated scale deposits.

The rate at which a fluid to be treated dissolves or ionizes zinc depends on the character and temperature of the fluid, with emphasis on the temperature for, as this increases, the rate of dissipation of the zinc also increases. Whenever the quantity of free ionized zinc available in the fluid is insufficient to overcome the scale-forming materials present, the latter will gradually overpower the treater and in a short time will arrest the dissolution of zinc. Therefore, the quantity of zinc that can be dissolved or ionized by a fluid in a given length of time will depend, not alone on the temperature and character of the fluid, but the area of the zinc exposed to the action of the fluid; and in the case of the treater this is the combined area of the zinc discs.

In planning a zinc-treater installation several factors have an important bearing on the size and number of treater units to be used. The most important is the volume of water to be handled daily and the temperature of the fluid, since both factors determine the amount of zinc that must be dissolved to counteract the action of the scale-forming material and render it inert. All other factors being equal, the most satisfactory temperature at which the zinc is ionized is at 140° F. Water having temperatures below 140° F requires additional treater units. The unit lasts longer in the cooler fluid but the over-all efficiency is much lower.

One of the first successful zinc treater installations made in a gas-lift well was for an operator in the Gulf Coast area. Approximate depth of the well was 4000 feet with tubing set at about 2000 feet. Total volume of fluid produced was about 1500 barrels per day cutting 97 percent water with a temperature of 130° F at 2000 feet. Fluid was produced through the tubing by means of flow valves. After 90 days on production during which acid was introduced daily into the well to inhibit scale formation and with one acid job run at the end of the first 45 days, sufficient scaling had taken place to cut oil production from 45 to 13 barrels per day. Since it was uneconomical to produce the well beyond this point the tubing was pulled and cleaned and the production cycle resumed.

Prior to installing the zinc treater the tubing was pulled for a reconditioning job and a portion of it was found to be fairly well filled with scale, notwithstanding that it had been treated with acid 45 days before. The more badly scaled joints were replaced and the balance were cleaned. Flow valves also were cleaned or replaced so that the equipment was in good condition when the treater test was started. In addition the surface fittings, with the exception of one bull plug and the flow line, were also cleaned or replaced. The bull plug in the surface fittings at the well was fairly well filled with scale but was retained in the assembly as a check on the action of the treater.

The treater installation consisted of several two- and three-inch units, each

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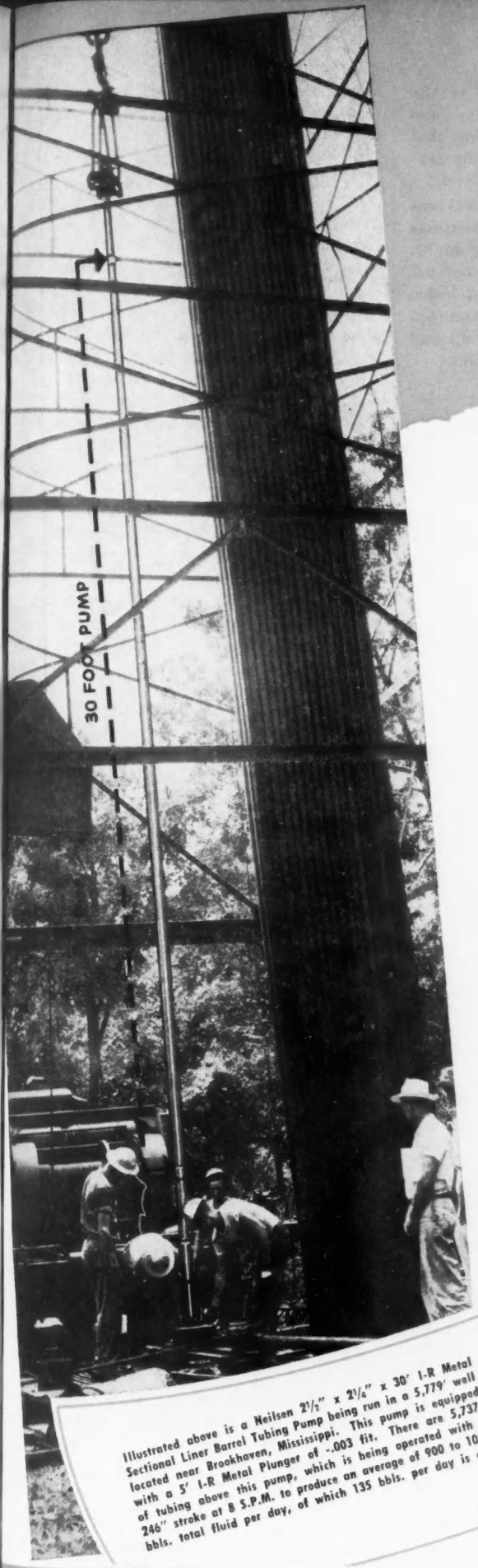

Illustrated above is a Neilsen 2½" x 2¼" x 30' I-R Metal Sectional Liner Barrel Tubing Pump being run in a 5,779' well located near Brookhaven, Mississippi. This pump is equipped with a 5' I-R Metal Plunger of -.003 fit. There are 5,737' of tubing above this pump, which is being operated with a 246" stroke at 8 S.P.M. to produce an average of 900 to 1000 bbls. total fluid per day, of which 135 bbls. per day is oil.

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Neilsen I-R Metal Sectional Liner Barrel Tubing Pumps, combine high strength, corrosion resistance and low turbulence. They have standard A.P.I. dimensions and are equipped with streamlined fittings. I-R Metal is extremely hard, excellent in corrosion resistance, and has a very low coefficient of friction. Neilsen I-R Metal Plungers can be operated against I-R Barrels without seizing—thus avoiding temperature difficulties and making this the most outstanding Subsurface Pump material known.

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four feet in length, which were placed in a section of three-inch tubing that was slit in several places so that the well fluid could flow into the tubing then up and around the treater units. The three-inch tubing was run on the bottom of a smaller string (2½-inch) through which the well was being produced. When the zinc treater was installed the daily introduction of acid into the well was discontinued.

A production check at the end of the first ten-day run showed no decrease in production as had been the case when acid only was being used to combat scale. At the same time an inspection was made of the scaled bull plug and it was noted that some of the scale formation had disappeared and the balance was softening up.

Scaling of the valves and seats of the dump valve also presented a severe problem in this well where the operator had found it necessary to clean the dump valve at least once a week. After the treater was installed no further scaling trouble was experienced with this valve as indicated by a check made several weeks after installation of the treater which showed the valve and valve seats not only scale free but that the old scale on other parts of the separator was being gradually removed.

Further evidence of scale removal was afforded by leaks around the christmas tree fittings and flow line. Scaling doubtless had set up corrosive action but the scale had acted as a seal against leaks. This "seal" was broken when the ionized zinc caused the scale to soften up and pass away, thus opening the leaks.

Analysis of Scale Deposit

While compositions of scale deposits formed through the action of formation waters are generally similar, it is nonetheless true that there is a difference in the percentage of calcium and magnesium found in such waters. Following is the analysis of a sample of scale deposit found in the test well under discussion. It should be noted that the scale is made up almost entirely of calcium carbonate which readily yields to the action of the zinc treater:

Water removed at 105° C.	7.10 percent
Calcium Carbonate	68.88 percent
Magnesium	.18 percent
Ferric Oxide	2.52 percent
Chlorides	Trace
Sulfates	Trace
Ignition loss not including water removed at 105° C	19.12 percent

Summarizing the results of the above test it was found that the zinc treater not only prevented scale formation in or on the subsurface well equipment but kept it from forming on the surface equipment and also removed part, or all, of the scale deposits present when the installation was effected.

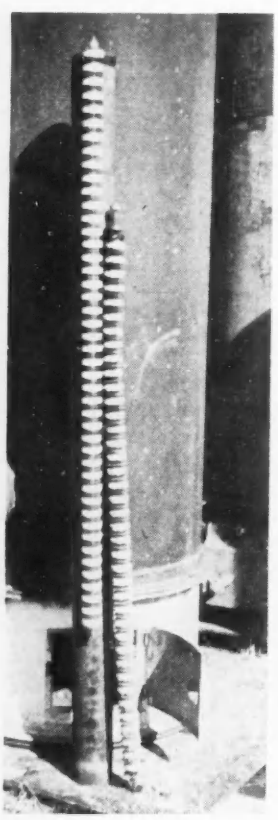
Results observed from various treater installations indicate that the treater unit will operate satisfactorily and efficiently under the same general conditions as those found in the test well, for from four to six months, and in some cases even longer, before it is necessary to recondition or replace them.

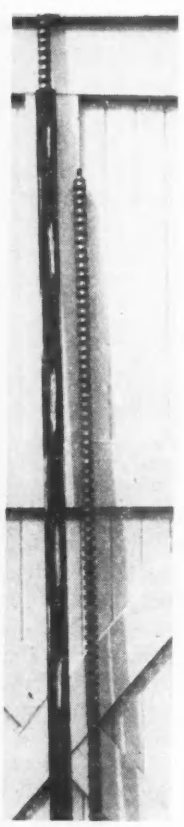
Total cost of the treater units on this well amounted to $1600, which included the original installation cost of $800 and two additional replacements at $400 each. Against this expense the operator was saved the cost of daily acid treatments as well as a minimum of four acid jobs for the year and the need of cleaning and replacing a portion of the tubing string when pulled. In addition the treater units reduced corrosive action of the water which occurs under the scale. The average cost per month for a year was $135.

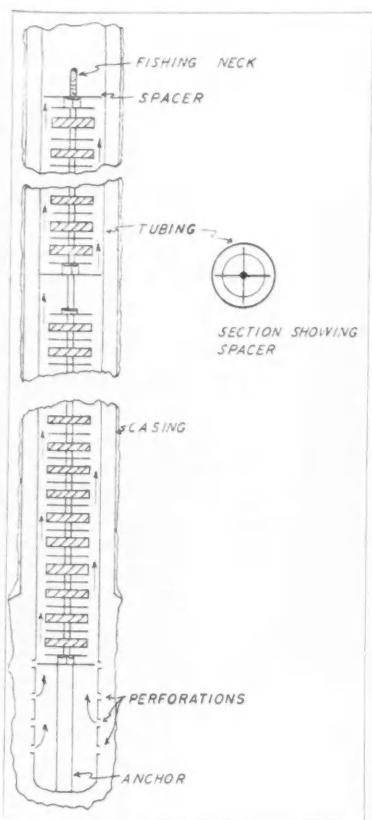
While any increase in the daily production of a well does not reduce its operating expense, any change in operating methods which will produce more oil will do so indirectly. In the case of the well under discussion the increase in the well's average production amounted to seven barrels per day or a total of approximately 2500 barrels during the 12-month period, this gain having a gross value of about $5000.

Judged from the standpoint of inducing a more normal production cycle, the installation of a zinc-treater in a well subject to scale formation can be said to result in physical improvement of such a well. The fact that a well is capable of producing its normal daily production means that the formation water will be produced as it enters the well and so cannot build up or cone up as it will when the production declines steadily.

Other installations have been made in gas-lift wells in this and other areas with the size and number of treater units used in each case varying with well conditions. Where an operator preferred to make the treater installation without pulling the string of tubing the proper







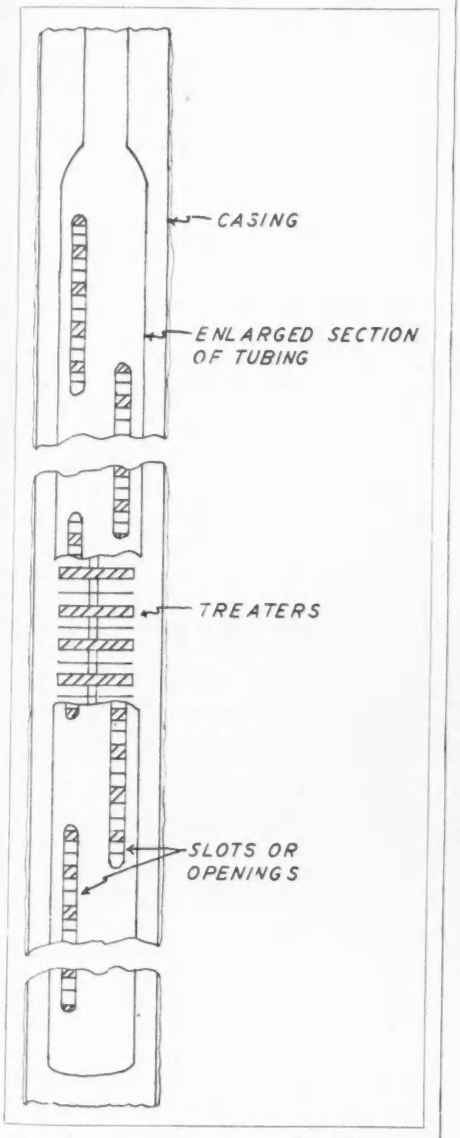
LEFT: Two treater units made up of alternate zinc and copper discs are shown. The one on the right was pulled from a corrosive well after 7½ months and shows by comparison with the new unit (left) the amount of metal eaten away by the corrosive fluids.

CENTER: Slot-type shell (left) in which zinc-copper treater unit is installed. Corrosive well fluids flow in and around unit as they move up the casing. At right is treater unit made up of alternated zinc and copper discs.

RIGHT: Treater installation in tubing, placed with wire line where tubing is not pulled for installation.

size unit or units were run in on wire lines. This practice is not recommended, however, since the units reduce the cross-sectional area of the tubing. To avoid this difficulty it is recommended that the tubing be pulled and a section of larger diameter placed on the lower end of the string. After rerunning the tubing the treater units can be run in on a wire line and placed in the larger section, eliminating any possible restriction in area and still making it possible to recover the units without again pulling the tubing.

For maximum efficiency treater installation should be checked periodically at intervals from four to six months and replaced where necessary or as soon as scale begins to appear on surface and subsurface equipment. While the installations have their limitations their use under certain conditions appear to assure good results in solving scale formation problems in gas-lift wells.



Treater installation in flowing or gas lift well. Units are placed in an enlarged section of tubing at lower end of string, slotted so fluid can flow up around them.

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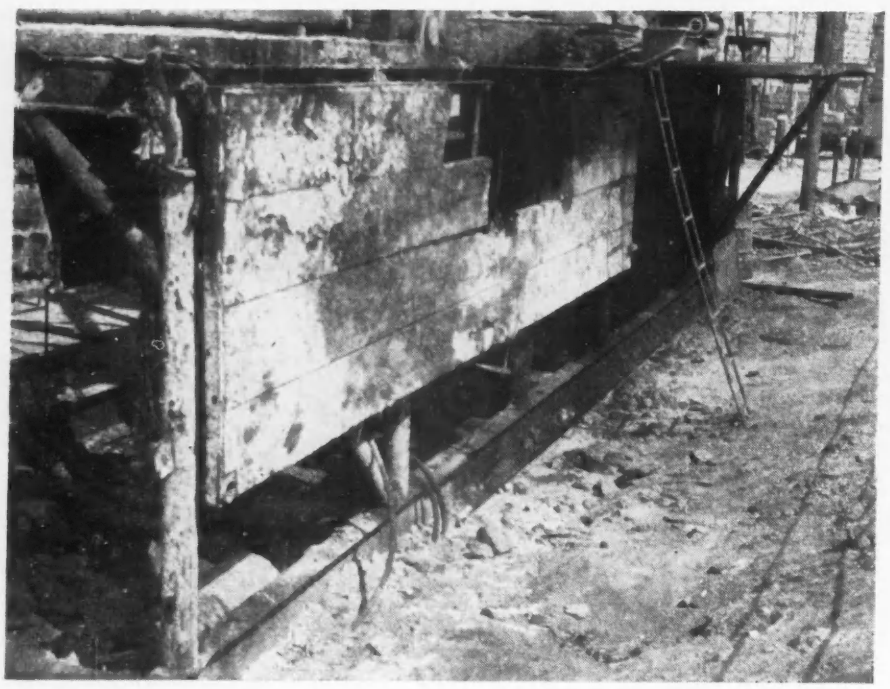
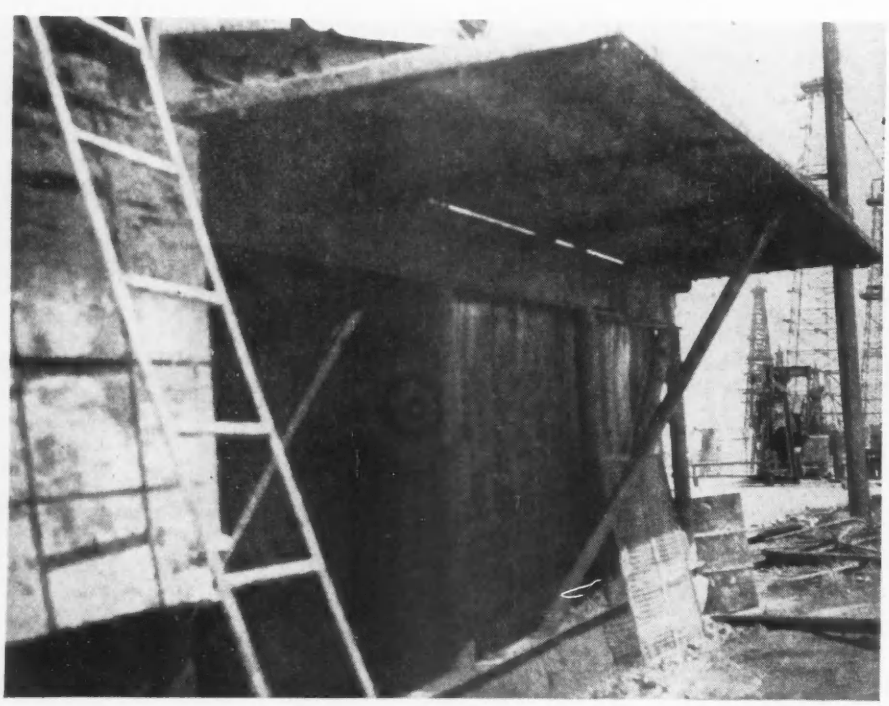
Folding Walkway

For Workover Rig



Rig substructure showing catwalk section lowered to side of structure for moving.



Catwalk on rig substructure showing section raised and supported with one brace just before lowering for shipment.

CATWALKS four feet wide are used on rigs employed for workover jobs. The walkways are permanently attached to each side of the rig substructure with hinges for folding down when moving so as to save time when rigging up or tearing down.

The substructure is more or less conventional, having large structural beams for top and bottom sills, separated by risers of four-inch pipe, braced and welded to support any load when running pipe or drilling a well. The folding walkways have frames of angle iron filled in with common two-inch undressed flooring supported by three cross members or joists which are welded to the frame.

The angle iron is placed in the frame so the flooring will set flush with the walkway frame. It is attached to the structure with round head carriage bolts drawn tightly to lower the heads below the surface of the walk so as to present a smooth surface and not interfere with walking or moving equipment from one point of the rig to another.

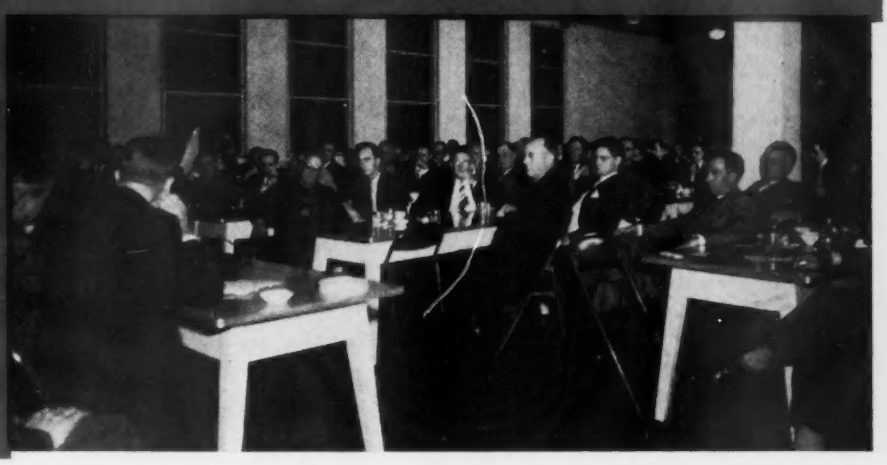
These walks are supplied in four sections, two on either side of the substructure. They are attached to the top sills of the rig with five hinges using bolts for hinge pins. The part of the hinge attached to the rig substructure top sill is made of two pieces of channel iron, back to back and drilled near the end to receive the hinge bolt. The part attached to the walkway is welded to each end piece and the three center walkway sills, drilled to match the holes in the forked section on the rig top sill.

Two-inch pipe is used to make the supporting posts when the walks are raised in working position. These pipes are held in place at the lower end with one-inch pins welded to the bottom sill. The top end of the supporting posts is secured to the walk section by splitting the end of the post to slip over the angle-iron frame where a retaining pin is inserted to prevent dislocation.

When rigging up, the walkway sections are raised until the floor is horizontal when the diagonal braces are placed in position. Three of these braces are employed to each section. Braces and retaining pins are identical so any one will fit into position without numbering or selecting a particular part for a particular location.

Experts Discuss *Water-Flood Problems*

By ANTHONY GIBBON
Mid-Continent District Editor



Water-flood operators of Oklahoma and Kansas discuss their problems.

THROUGH THE COOPERATION of the Bureau of Mines, WORLD OIL presents, in question-and-answer style, a report of a special meeting of water-flood operators so that operators in other sections of the country may obtain the benefit of the information brought out at the Bartlesville, Okla., session.

APPLICATION of water flooding in secondary oil recovery has gained wide recognition throughout the industry. This method of extracting oil presents unique problems not encountered in primary operations and so the task of initiating a successful water flood and conducting it to its economic limit is marked by many expedients necessary to solve such problems. As one engineer puts it: "No two water floods are alike; no two wells are alike; no two feet of producing formation are alike."

Realizing the truth of this, water-flood operators in Oklahoma and Kansas meet regularly to discuss their problems and exchange information. An annual feature is the so-called "Questions and Answers" meeting usually sponsored by the U. S. Bureau of Mines at Bartlesville, Okla.

Recently such a meeting was held at Bartlesville with D. B. Taliaferro of the Bureau of Mines as moderator. A panel of experts qualified through years of experience in secondary recovery work in the Mid-Continent and Pennsylvania received written and oral questions and gave the answers. With W. A. Heath, Earlougher Engineering, Tulsa, as chairman, the experts included R. A. Morse, Stanolind Oil & Gas Company, Tulsa; Wade Watkins, Bureau of Mines, Bartlesville; Kurt Andresen, The Carter Oil Company, Tulsa; Fred Kluck, The Ohio Oil Company, Eureka, Kansas; Tom Lawry, Deep Rock Oil Corporation, Tulsa; and J. A. Wiley, Wellsville Oil Company, Nowata, Okla.

Question: What method can be successfully employed to plug an old "plugged" hole in a water-flood project, assuming: (1) that there is no casing in the old hole; (2) that water from a nearby well is coming into the hole in rather large quantities; (3) that a normally dry sandstone formation 50 feet above the producing sand is found to be filling with water; and (4) that the old hole can be cleaned out to the top of the sand?

Answer: The best method is to clean out the well to the top of the sand and set a string of two-inch tubing on a packer with right and left hand threads over the packer. A 2- by 3-inch plug nipple with a bolt thread is set in the tubing. The tubing is cemented in place and the well flows through the tubing while the cement sets. Then a bolt is run on a small string of pipe and screwed into the plug nipple. The two-inch tubing is then unscrewed and a few sacks of cement run in through the tubing. If the upper sand is making water the process may have to be repeated above this upper sand. It is recommended that the input wells be killed until no water is flowing into the old well and then this well be cemented from top to bottom.

Q: Should old abandoned wells be drilled out and cemented before a flood is started or should you wait and see if they show on the surface during the flood and then plug if necessary?

A: If the wells are not plugged at first

they will have to be plugged eventually. Generally, it is easier to plug them before the flood is started.

Q: How do liquid permeabilities compare with gas permeabilities? What advantage, if any, would liquid permeabilities have over air permeabilities in predicting water flooding?

A: Permeability measurements are used primarily for comparative purposes to predict injection rates. Since air permeabilities are more or less standard, these values are most useful for comparative purposes. Relative permeability of a core to air or water is much more complex and it is doubtful if it can be used to predict waterflood behavior. A correlation between air permeabilities and injection rates to predict injection behavior for new leases has been used. Air permeabilities are constant at different pressures whereas water permeabilities usually vary with pressures. If the pressure range is from 5 to 50 pounds per square inch the permeability may vary five or ten times. Air permeabilities can be used to predict injection rates and indicate by-passing or an obstruction in the hole. With good care to exclude all air and bacteria, constant liquid permeabilities can be obtained which show no effect of differential pressures, when the core is completely saturated.

Q: Is there a minimum and/or maximum rate of injection per acre-foot of sand which if exceeded will cause a marked decrease in efficiency?

A: Generally, the first 100 barrels per acre-foot form the critical volume, and unless the permeability is unusually high an effort is made to inject as much water as possible and stay below the critical pressure. The maximum rate pertains to the first period of injection in which you may be able to inject three or four times the normal rate. After this first period it is difficult to inject as much water as desired.

Q: Can water-oil ratios be controlled by varying injection rates?

A: There is a possibility of obtaining lower water-oil ratios with lower injection rates, but usually the produced volumes of both oil and water are decreased when the rate is lessened. Before the lease responds to injection the rate is a matter of opinion; afterwards, the rate is adjusted to that which obtains the maximum production. Selective plugging of watered-out sands is the best means of controlling injection rates. Generally, not much can be done about varying injection rates because operations are usually carried near to the critical pressure. Definitely the injection rates should not be increased if the pressure is raised above the critical value.

Q: What is meant by critical pressure and what is that pressure per foot of depth?

A: The critical pressure is the pressure of break-through or bypassing of the injected fluid, often referred to as the pressure at which the over-burden is lifted. Usually the critical pressure is about one pound per square inch at the sand face for each foot of depth. Critical pressure varies with different areas. In Kansas the critical pressure is about one pound per foot of depth, but in North Texas it is nearer .8 pound per foot of depth. In a shallow field in the Nowata (Okla.) area the critical pressure was 1.7 pounds per foot of depth, whereas in a sand 200 feet deep near Bartlesville the injection pressures were increased to 2.25 pounds per foot of depth without evidence of break-through.

Q: Is there any difference between the critical pressure in a pumping or a flowing flood?

A: There is no difference except that in a flowing flood the pressure would be exerted over the entire area. Usually, it is not the pressure alone which causes the break-through, but the total force applied; that is, pressure times area. More often the break is vertical like a shot crack rather than an actual lifting of the overburden. The lithology of the exposed beds has a great influence on the break-through pressure. For example, when employing the Hydrafrac process to rupture sands, it was found that much higher pressure-depth relationships were required to break through in pure sands than in shoestring sands where shale and sands are interbedded. The break-through doesn't take place in sands but in the shales or lignites. Some operators report injecting water at critical pressure and then after reducing the pressure, are able to increase the pressure gradually to a value above the original critical without break-through. Perhaps the initial critical pressure was not a true break-through resulting in increased water production from the producing wells, which is, after all, the true indication of a break-through.

Q: How much of the total volume of water needed during the life of a project will be recycle water?

A: The amount of recycled water is a function of the non-uniformity of the sand, since with a vertical interface it would be theoretically possible to have 100 percent oil one day and 100 percent water the next. Any departure from perfect homogeneity of permeability and fluid saturation would result in the early flushing of a permeable bed to permit much water to be produced through this bed while oil was being flushed from other beds.

In shallow areas of Nowata County, Oklahoma, with the price of oil at $1.50 per barrel, it was economically profitable to recycle about 2½ volumes of water for each volume of original water. At the current price of oil it is profitable to produce wells with higher water oil ratios, so that the recycled water oil ratio is now about four to one. Where 50 percent of the total pore space underlying a project must eventually be filled with injected water, the total amount of injected water required will be 150 to 200 percent of the pore space.

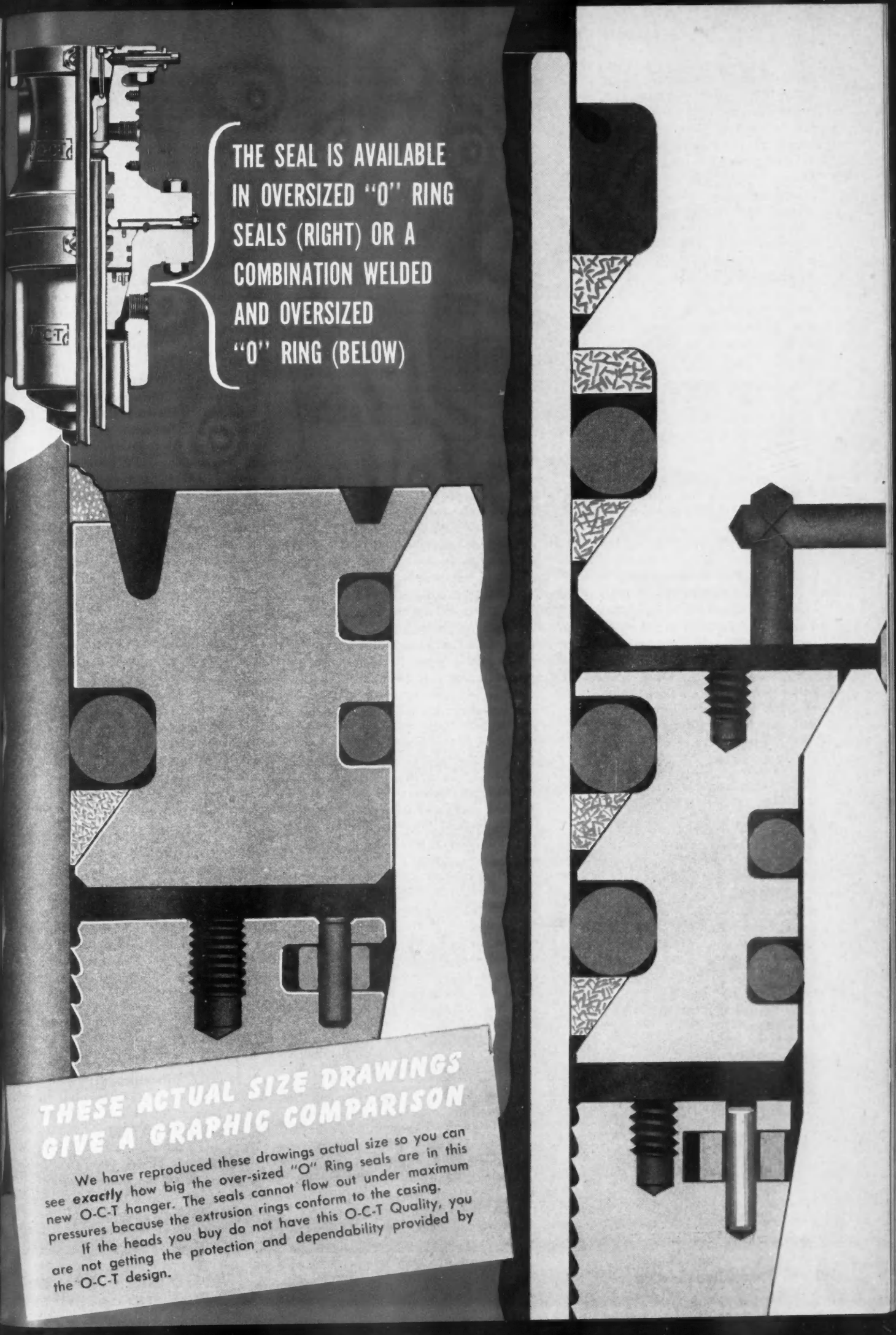
Q: What is the maximum content of connate water permissible in predicting a successful flood?

A: The maximum water content may vary from 10 to 60 percent, depending upon the sand. In Mississippi the connate water is 35 to 50 percent with no water production. These sands could be water flooded. In other sands, 40 percent water saturation is too high. Water saturation could best be tied in with capillary pressure characteristics. If we find that the capillary pressure curve shows a minimum saturation of 20 to 30 percent at 40 pounds per square inch, then anything in that range could be successfully flooded. If the water saturation in cores is 15 or 20 percent higher than the minimum irreducible, then a flood might not be successful.

In one project where the water saturations were 40 to 50 percent, the fear was not that the property would not flood, but that 15 to 25 percent of the sand was filled with water instead of with recoverable oil. Some projects where cores showed 50 percent water saturation have been in the midst of the most successful floods. It depends upon the accuracy of measuring the water content. Higher connate water saturation may result in a lower residual oil saturation and more recoverable oil. The maximum amount of water saturation is largely a matter of economics. Possibly a 100-foot section of sand with 45 percent water saturation could be flooded, whereas a 12-foot section could not be flooded profitably.

Q: Which is preferable—continuous flowing of producing wells or intermittent flowing?

A: Under good operating conditions, and


THE SEAL IS AVAILABLE IN OVERSIZED "O" RING SEALS (RIGHT) OR A COMBINATION WELDED AND OVERSIZED "O" RING (BELOW)
THESE ACTUAL SIZE DRAWINGS GIVE A GRAPHIC COMPARISON
We have reproduced these drawings actual size so you can see exactly how big the over-sized "O" Ring seals are in this new O-C-T hanger. The seals cannot flow out under maximum pressures because the extrusion rings conform to the casing.
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assuming the flood pattern is not circular, intermittent flowing will recover more oil than continuous flowing because it disturbs the pattern which might become too well developed and permit bypassing of oil. On the other hand, with intermittent injection such as when the injection plant is shut down, something happens to the oil water interface so that recoverable oil would be lost. Generally, the idea is to get as much water as possible into the sand. Because of increased well-head pressures the intermittent flowing oil well will produce in eight hours as much oil as in 24 hours of continuous flowing.

Q: Assuming that there will be no drainage by offset operations, will more oil be recovered ultimately by pumping or by flowing producing wells to an economic limit?

A: Since operating costs are lower on flowing projects, the economic limit intersects the decline curve at a lower producing rate, resulting in more ultimate recovery. Some floods which have reached an economic limit by pumping have been converted to flowing, with additional recovery. In narrow fields in Greenwood County, Kansas, where wells are deeper, the increased reservoir pressure required to flow wells might bank much oil outside the producing limits and result in lost oil. Here wells are pumped five or six years to an economic limit and then converted to flowing. On one well the oil-water ratio increased after conversion.

Q: What is an accurate method of determining connate water saturation?

A: A major oil company in the Mid-Continent area uses the restored state method to simulate original conditions by displacing brine-saturated cores with oil at gradually increasing pressures to a final pressure where there is no appreciable change in water saturation. Some corrections must be made due to elevation above the oil-water contact. These saturation values are checked with those of oil-base mud cores with reasonable agreement.

At Pennsylvania State College, experiments using Bradford oil to displace natural brine from Bradford cores have in no case given water saturation values as low as those obtained on oil-base mud cores. Connate water saturation values should be checked by two independent means.

Cores taken two years ago in Bradford showed 15 to 25 percent total water, whereas capillary pressure methods indicated about 35 percent connate water. Recent uncontaminated cores showed water saturations in the neighborhood of 2 to 5 percent, whereas capillary pressure methods still showed water saturations between 25 and 35 percent.

In laboratory tests water-base mud core samples flooded with oil obtained residual water saturations of about 24 percent, whereas adjacent uncontaminated samples taken with oil-base mud showed about 26 percent water. In another instance the values were 43 and 45 percent.

Q: Why will a water input well which has been taking water at full pressure for some time, suddenly run away, and take 40 to 80 barrels per day, but after being pinched back for a short time, will again take water at full pressure without running away?

A: This has happened several times. A well would be taking 40 to 50 barrels of water daily at line pressure and then overnight the intake rate would be doubled and then doubled again the next 24 hours. In 1931 a company injected water into one well to obtain a break-through until an adjacent well showed a well-head pressure within five pounds of that at the input well. The injection well was then shut down and the pressure raised gradually until it exceeded the original critical pressure. Perhaps there is some resistance in the sand which breaks down to open another void space. When this is filled up the pressure builds up again to break down another resistance. Conceivably, there could be a break-through of a sheet-like character, which, if checked before erosion commences, will heal itself and later it is possible to exceed the original break-through pressure.

Possibly the operating pressure may be extremely close to the break-through pressure and a temporary fluctuation of 20 to 30 pounds may exceed the critical pressure to cause a break-through which will "settle down" when the pressure is reduced. Then if for some reason this pressure is again exceeded, another break-through will occur.

Q: Is there any experience of flooding limestone or dolomite reservoirs?

A: In San Andres dolomite in West Texas no bypassing was observed for the first six to eight months. Several other injection wells were then started. Immediately thereafter they got severe water break-through without additional oil. In primary water-flooding at East Haynesville, Louisiana, where 20,000 barrels daily are injected into less than a dozen wells, it is calculated that at least 40 percent of the pore volume is being flooded out.

In the Graber pool in Kansas, the casing opposite the Kansas City lime at 2200 feet is ripped to permit water to enter the Hunton lime at 3200 feet by gravity. Chokes and Teleflood meters are installed in the casings to regulate and measure the flow of water into the oil reservoir. There is no way of controlling the amount of water from the surface except to change the size or to raise or lower the choke. The flowing fluid actuates a hammer in the meter, the sound of which is picked up and recorded at the surface.

In the Turner Valley, reef-type limestone pool in Alberta, Canada, Royalite Oil Company injected water into one down-structure well 8000 feet deep to increase the rate of oil production from producing wells on 40-acre spacing. This project is comparatively new and some time will be required to reach definite conclusions.

In several Mississippi Chat fields in Kansas, produced water is injected into down-structure wells resulting in increased oil production. In a Devonian limestone pool in Illinois, one well had produced 38,000 barrels of oil by the time its rate had declined to three barrels of oil and no water daily. It was then shut down and offered for sale. After standing two years, the well was reopened and both oil and water were found in the hole. It produced 17,000 barrels of oil and much water before a down-the-hole pump was installed to handle the increased water production. To date the well has produced 125,000 barrels of oil and is still producing.

Q: What is the general procedure in settling for drilling and other damages resulting from a water-flood? Is pasture considered a growing crop in Producers Form 88 lease?

A: In Oklahoma or Kansas, pasture is not considered a growing crop. Form 88 lease says lessor shall be compensated for all damages to land AND growing crops.

Q: Has anyone successfully flooded a sand which was producing 50 percent water from the oil producing sand?

A: It is often difficult to determine the exact source of the water, but there have been a lot of successful floods where the wells were producing water from the same sand. If the well is producing the oil and water from the same sand, it is doubtful if additional oil can be displaced from the sand by water flooding. Usually the water is coming from another sand which may be plugged off.

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LONG STROKE Hydraulic Pumping Jacks

CASE No. 1
PELTON
Model 512-9-30C-P
Pump Bore: 1½"
Pump Setting: 11,140 ft.
Surface Stroke: 30 ft.
Production: 300 B/D
Previous Equipment: Gas Lift

CASE No. 2
PELTON
Model 412-9-20A
Pump Bore: 2¼"
Pump Setting: 8,100 ft.
Surface Stroke: 20 ft.
Production: 430 B/D
Previous Equipment: Subsurface Hydraulic Unit

CASE No. 3
PELTON
Model 512-8-30C-P
Pump Bore: 2¼"
Pump Setting: 6,800 ft.
Surface Stroke: 30 ft.
Production: 825 B/D
Previous Equipment: 108" Beam Unit

CASE No. 4
PELTON
Model 412-8-20A
Pump Bore: 2¾"
Pump Setting: 3,900 ft.
Surface Stroke: 20 ft.
Production: 1050 B/D
Previous Equipment: 74" Beam Unit

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* Fewer Rod Partings
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Here are actual examples of PELTON Long Stroke Hydraulic Pumping Jack performance in California and Mid-Continent fields.

Long stroke pumping produces more oil than the short stroke method because pumps with larger displacement can be operated at increased plunger travel. Compared to beam pumping, the same fluid weight can be lifted with less rod stress or more oil can be lifted at the same rod stress. Sucker rod stress loads up to 40,000 p.s.i. are practical with long constant velocity strokes and soft rod reversals. Shock loads, whipping and other rod fatigue and stress increasing forces are reduced to a safe working range.

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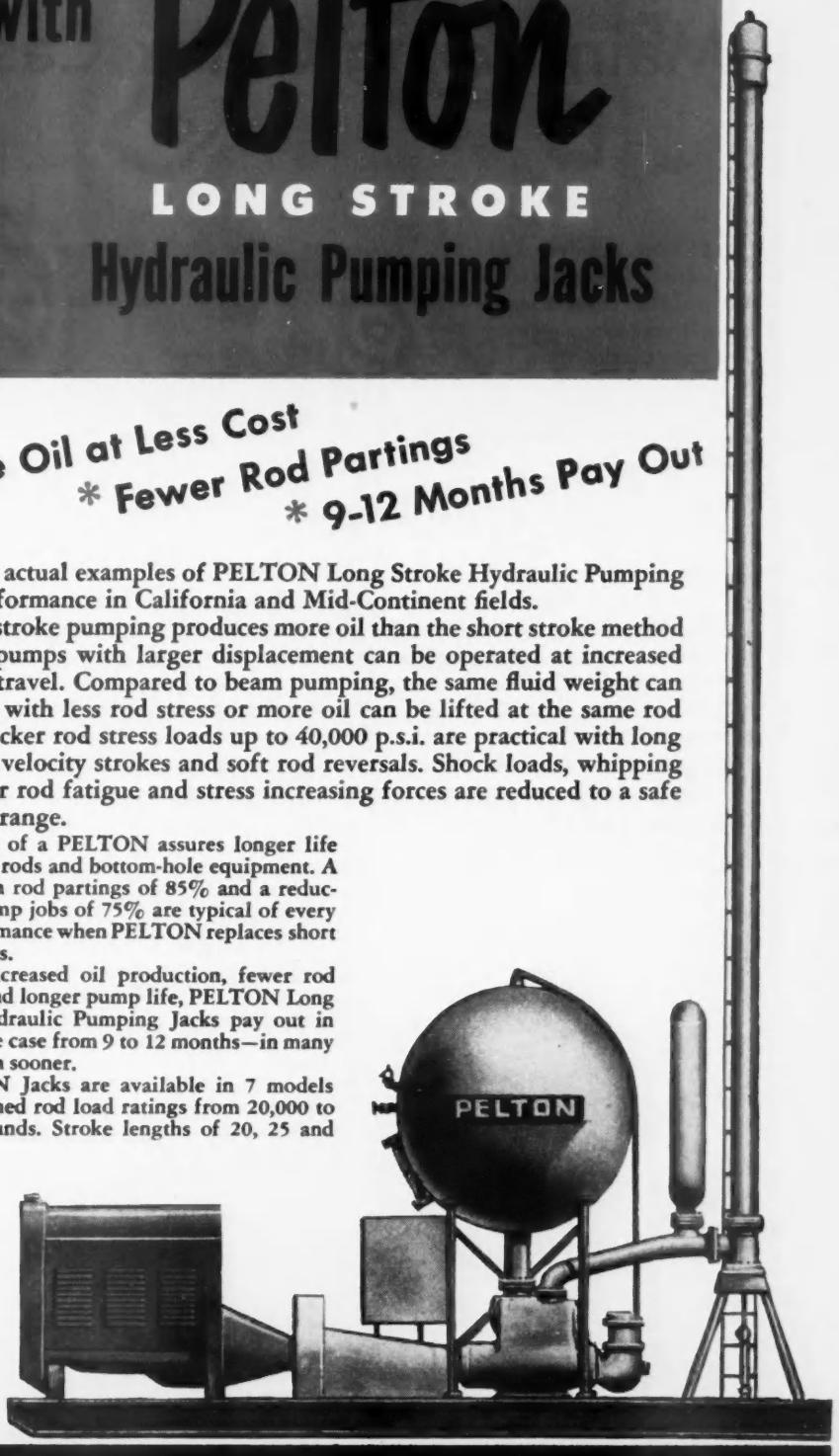
With increased oil production, fewer rod partings and longer pump life, PELTON Long Stroke Hydraulic Pumping Jacks pay out in the average case from 9 to 12 months—in many cases, much sooner.

PELTON Jacks are available in 7 models with polished rod load ratings from 20,000 to 40,000 pounds. Stroke lengths of 20, 25 and 30 feet.



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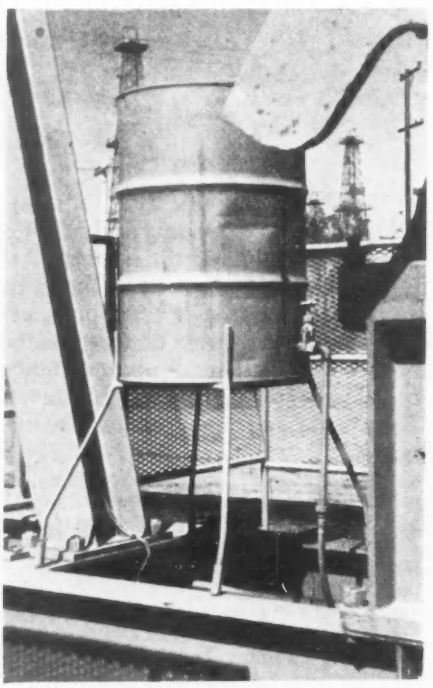
Maintaining Crank Case Oil Level

LUBRICATION of internal combustion engines with an outside reserve oil supply fed to the crankcase through automatic level controls is gaining favor among producers on the West Coast for individual pumping wells. Unattended power units of this type are assured of a continuous supply of lubrication and require only periodic inspection. Supply tanks differ in design and capacity, but most of them follow the same basic pattern.

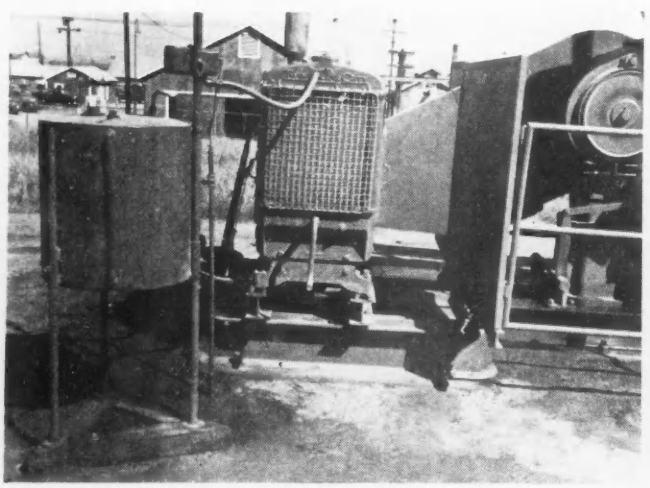
Long Beach Oil Development Company, with several hundred individual pumping wells in the Harbor area, installs a 30-gallon drum at each engine. The drum is mounted on a bracket beside the power unit, arranged so it may be removed easily by disconnecting a single feed line. The bracket is similar in shape to a carpenter's square, made of two pieces of angle iron so the horizontal section can be bolted to the engine foundation, allowing the short section to stand upright. A third piece attached to the top section carries a sucker rod cradle in which is set the 30-gallon drum of oil. Oil is fed from the drum through a standard fitting inserted in the small bung hole and flexible hose to the oil-level control instrument.

Shell Oil Company uses a shop-made tank to be installed permanently at the pumping well engine. It is supported on three standards, or legs, which slip through ferrules on the side of the tank and are locked with set screws when level. The retaining ferrules are short pipe nipples with bosses welded on the outside through which the hole is drilled and tapped for the retaining set screws. The bases of the legs are equipped with floor flanges which are nailed to a triangular foundation made of 2x4's. A standard size large bung is placed in the center of the top of the oil tank for filling and is closed with a standard CI plug. Breathing of the drum is provided for by installing a small connection at one side of the top head to attach a quarter-inch pipe, bent as a gooseneck to exclude dust and falling rain.

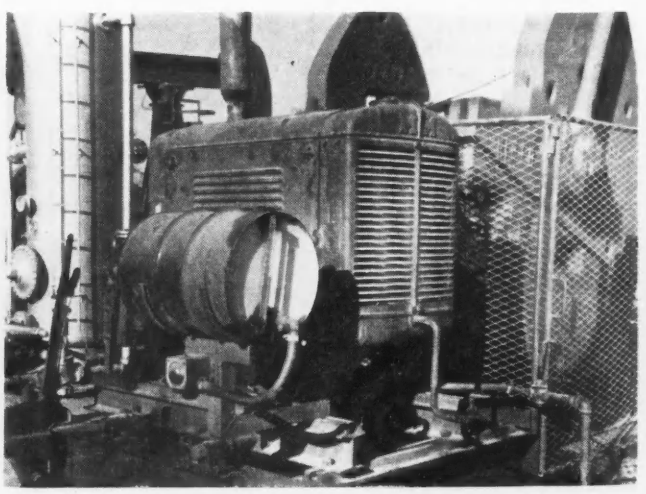


Crank case oil supply tank set inside the framework of the pumping unit.

Richfield Oil Company employs a standard 55-gallon oil drum as the supply tank at pumping well engines. A four-legged stand is built with the lower ends slipped into retaining ferrules welded permanently to the pumping unit foundation between the gear case and the walking beam sampson post. Pipe fittings attached to an outlet near the lower chime of the drum are used to connect a flexible oil proof hose that leads to the automatic level control on the side of the pumping engine crankcase. Oil is added to the drum when necessary through the standard bung hole in the top, which is fitted with a standard cap, drilled on one side to supply breathing air.

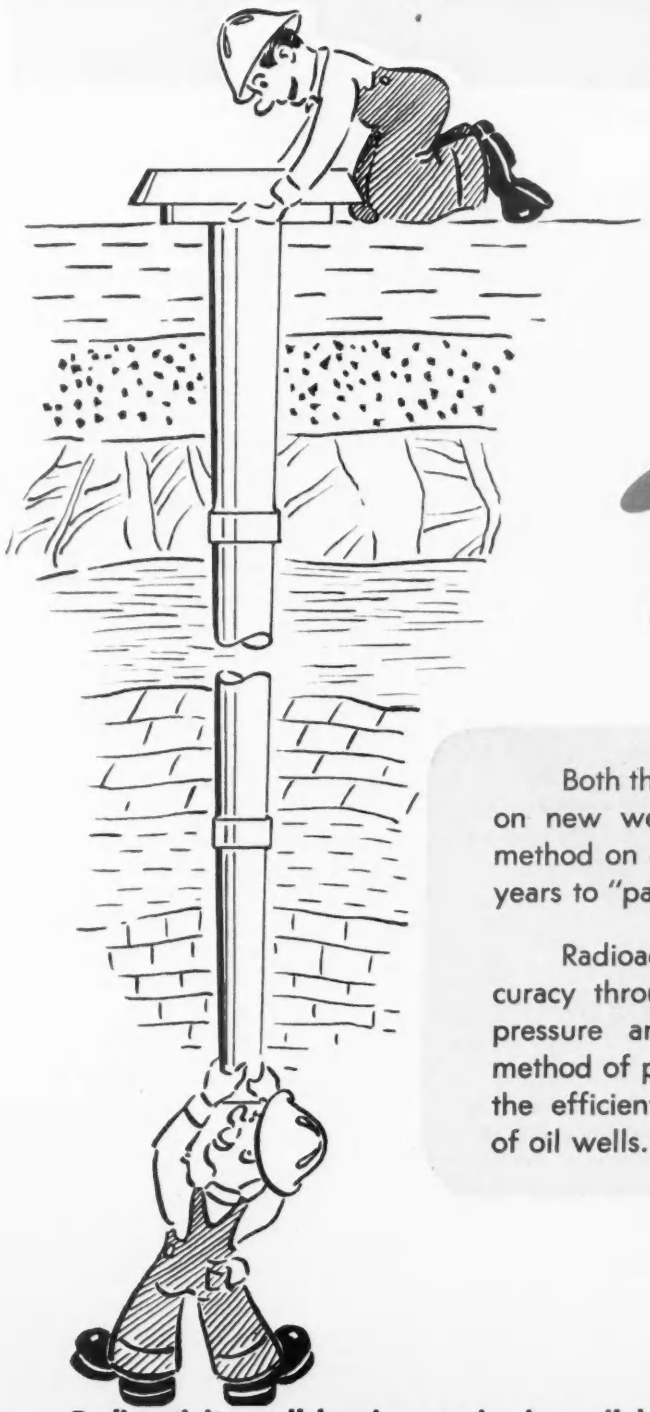


Pumping engine crankcase oil supply tank is mounted on a separate base which also supports the overheat cut-off on engine.



Crankcase oil supply tank set on bracket attached to engine foundation may be removed by disconnecting single feed line.

FORESIGHT *or* HINDSIGHT



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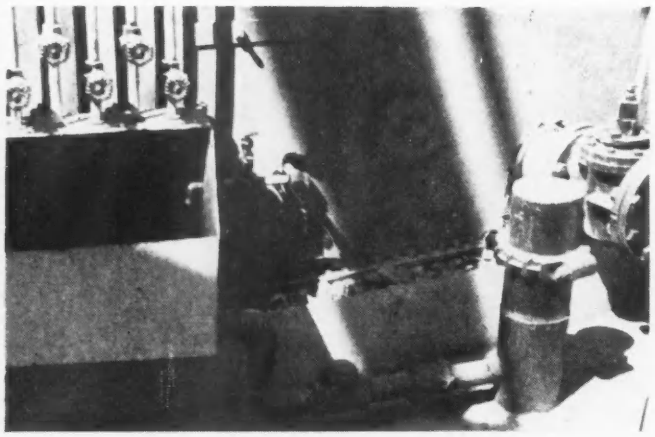
How to do it! PRODUCTION HINTS

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

HOW TO—Dispose of Waste Oil



Disposing of waste oil when taking samples from test lines on a treating tank is simplified and made safe when the line from the sample box is tied into a large drain to the waste oil pit. This part of the waste oil line rises vertically above the ground and is equipped with a groove so that a flat head plug, having a similar groove, can be connected with a two-bolt pipe line joint clamp.

The drain line is attached to the waste oil line a short distance above the level of the concrete pad so connections may be made without undue effort when repairing the lines or making changes.

As the large drain line is used also to carry large quantities of water from the treating tanks, the force of the flow frequently causes oil and water to back up into the sample box. This has been eliminated by installing a check valve in the small line between the union and the sample box. If the large line becomes stopped or clogged with sediment, the vertical riser can be opened by removing the flat head bull plug.

HOW TO—Store Positive Chokes

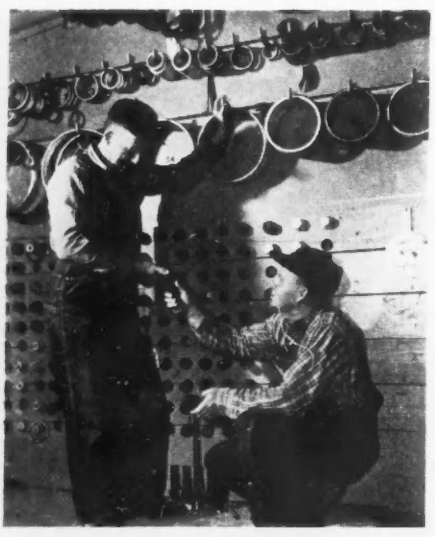


Photo courtesy *Phillips*

Proper storage of any equipment facilitates locating the desired piece and simplifies inventory. An outstanding example of good housekeeping at the production warehouse is illustrated here.

On one of the divisional walls in the warehouse, storage facilities for both the steel ring gaskets of various sizes and the positive chokes were provided. The wainscot of the wall was made of shiplap that extended several inches from the steel partition. Holes were drilled in the wooden wall at intervals of about four inches from centers. Into these holes were placed the stocks of positive well chokes. The orderly arrangement of different size chokes makes their selection quick and easy.

Above the choke storage wall is a steel panel to which has been welded short pieces of sucker rod bent at the end to form hooks. Such arrangements could be provided on wooden walls as well. Below each hook is a number which corresponds to a definite size steel ring gasket for use on flanges or well-head equipment. This orderly storage of gaskets makes selection easy and aids in keeping a full stock of all sizes.

HOW TO—Simplify Gauging Light Crude Tanks

As drilling goes deeper, and more fields producing light crudes are brought in, the problem of proper gauging of tanks becomes important. One gauger carries a can of talcum powder in his pocket and sprinkles the gauge line before it is run. As a check, a mixture of powder and distillate are spread evenly over the few inches at the tank level and the tape can be read to one-eighth inch accuracy.

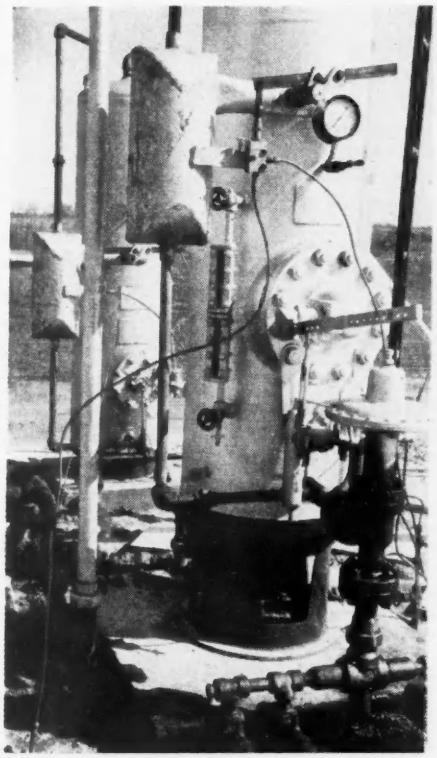
The coating of white powder makes an even white blanket over the sprinkled part of the tape, yet the numbers show through so that there is no danger of misreading the foot marks on the tape. As soon as the reading is made, the powder is wiped from the tape along with the light crude. A film of oil remains on the tape to make the powder adhere when the next tank is gauged.

HOW TO—

Guard Separator From Fluid Overflow

All separators will at times fill with liquid when the dump valve or operating mechanism fails to function. When this happens, valuable fluid is lost to the flare line or sent down the gas line where it either burns or passes into the possession of the gas company.

A simple means of preventing all loss of fluid is a second kidney and float above the operating float so that when



the operating float is submerged the second float goes into operation.

The upper float is connected to a pilot valve connected to the gas supply line. When the liquid is sufficiently high to cause the float to operate, it opens the pilot valve and allows gas to pass.

There are two arrangements for shutting off the wells in case the emergency float works. Where oil wells are feeding the separator, the gas works on a ball below a tee in the flow line header and shuts in all the wells until the lease man arrives and investigates the trouble. In gas condensate wells, the trouble is usually caused by hydrates freezing in the dump valve. Here the copper tubing connects to a regulator valve which reopens when the valve thaws out.

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When new wells are being cleaned into pits, a certain amount of shale is produced with the mud and oil. One company uses a ball of brass shavings, usually sold for cleaning pots and pans. The ball of shavings is placed just ahead of the choke bean so that the production from the well must pass through it before reaching the choke.

As soon as the well is placed on the lowered rate of flow, the shavings filter out all the foreign material which would clog up the choke. At periodic intervals, usually daily during the first few weeks that the well is on production, the well is shut in and the filter element cleaned out.

By cleaning the element every 24 hours when the tanks are gauged, an accurate record of the well's performance may be obtained, as there is no likelihood of the chokes being clogged up part of the day. This is especially true when potential tests are run for allowable purposes, since the choke may stop up during this particular 24-hour period and a lesser allowable obtained.

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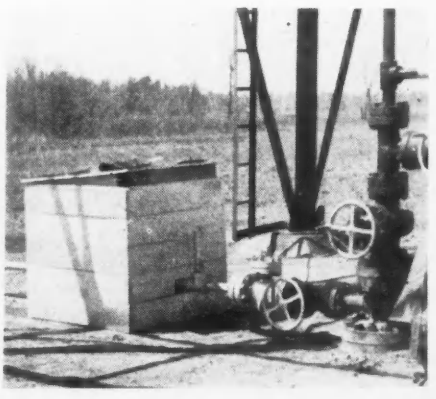
The continual interruption of the flow of gas through the gas supply line in a gas-lift operation may cause a considerable drop in temperature across the valve seat due to the pressure drop. This temperature drop may, in cold weather, cause the formation of hydrates which will clog the intermitter.

One operator in the Holly Ridge field of Louisiana experienced considerable trouble with this freezing of gas lift control valves on certain wells. Hydrates formed in the intermitter valve as well



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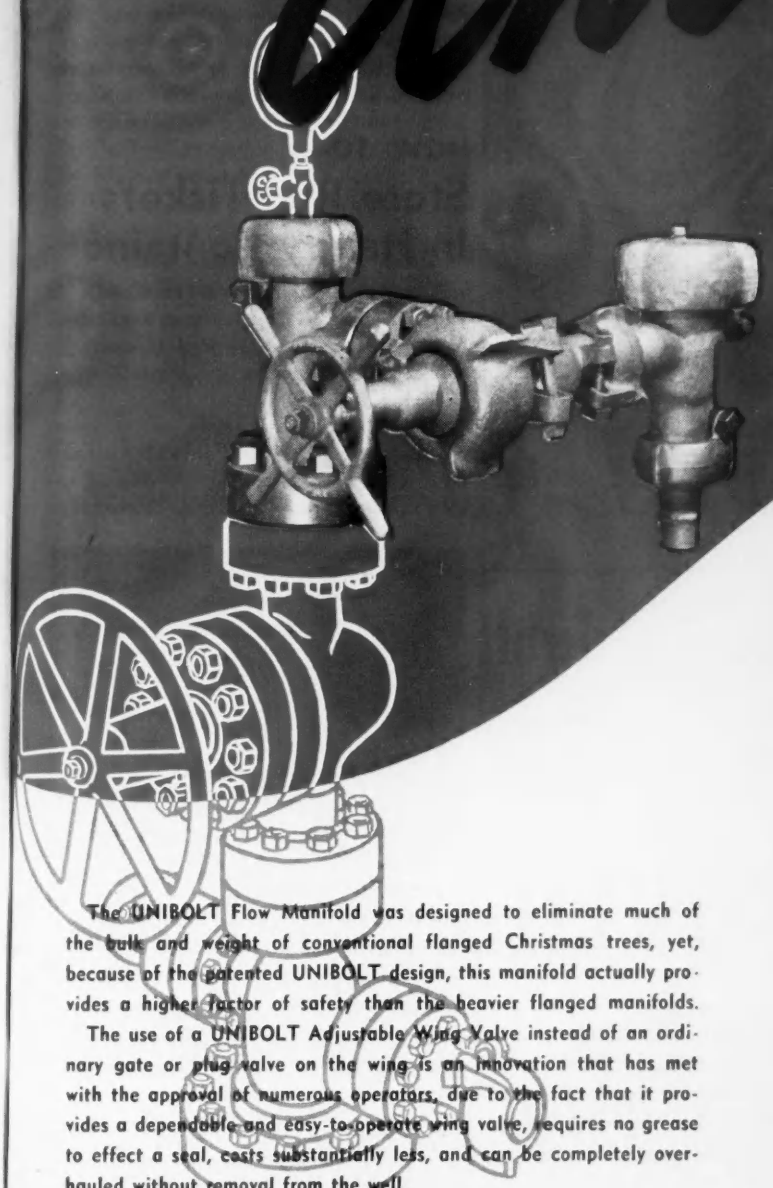
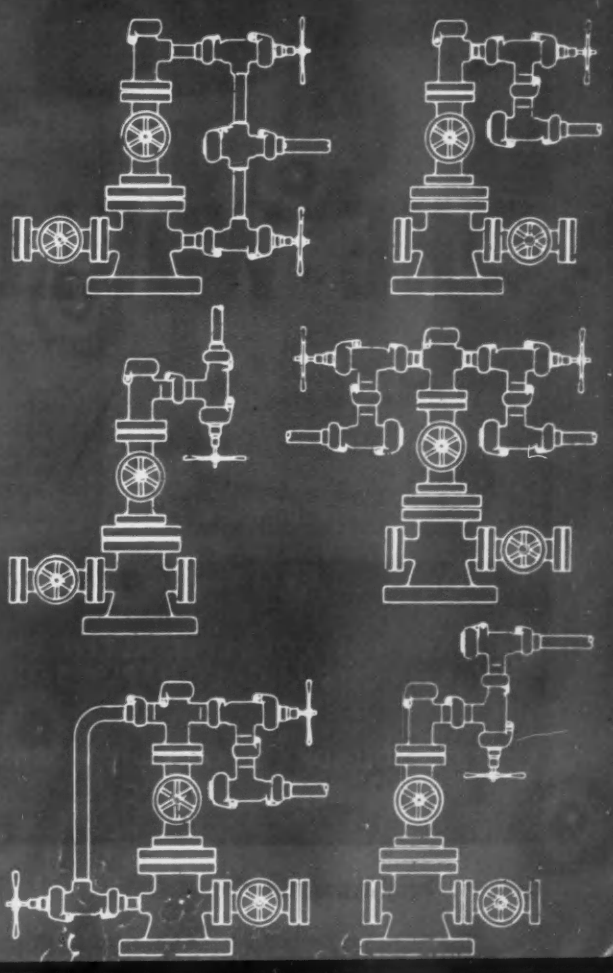


UNIBOLT ADJUSTABLE WING VALVES AND POSITIVE CHOKES MAY BE ASSEMBLED IN ANY DESIRED TYPE OF MANIFOLD TO BEST SERVE INDIVIDUAL WELL REQUIREMENTS



The UNIBOLT Flow Manifold was designed to eliminate much of the bulk and weight of conventional flanged Christmas trees, yet, because of the patented UNIBOLT design, this manifold actually provides a higher factor of safety than the heavier flanged manifolds.

The use of a UNIBOLT Adjustable Wing Valve instead of an ordinary gate or plug valve on the wing is an innovation that has met with the approval of numerous operators, due to the fact that it provides a dependable and easy-to-operate wing valve, requires no grease to effect a seal, costs substantially less, and can be completely overhauled without removal from the well.

Another important advantage of the UNIBOLT Flow Manifold is its complete interchangeability. All connections in the manifold are standard forged steel UNIBOLT Couplings, and any unit in the assembly, or part thereof, may be easily and quickly replaced in the field without removing the manifold from the well.

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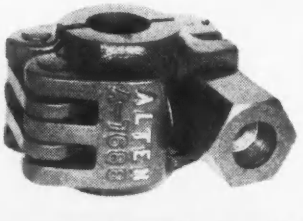

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as in the supply gas regulators during cold weather. To alleviate the situation, an air-tight wooden box was erected over the intermitter valve and regulator. The box was inexpensively made and could easily be dismantled during the summer if desired. A hinged lid made it possible for the pumper to check the controls periodically or reset the intermitter.

The wooden box was kept warm inside by the heat given off by the flow line which passed through the box. The flow line handling the oil and gas produced from the well may be seen barely covered and passing beneath the box.

HOW TO—
Store Run Tickets In Handy Container

A novel and practical receptacle in which run tickets, delivery invoices, and other papers can be stored temporarily for later collection by the lease foreman is illustrated.

The container consists of a short length of two-inch pipe, threaded on one end, which is welded to the side of the gate post leading into the lease tank

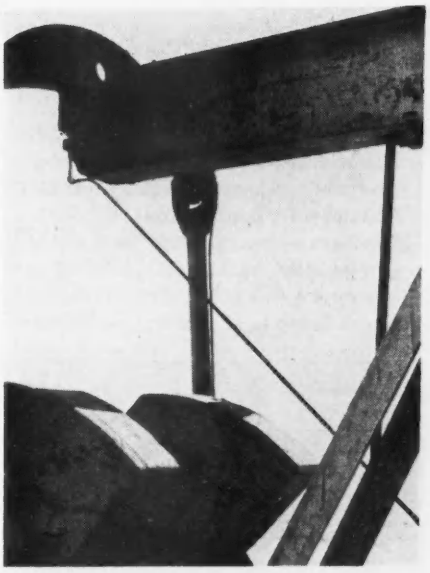
farm. Any length nipple can be used, depending upon the size or type of papers that will be placed in it. A four- to six-inch length has been found to be of the most practical size. Protection from the weather is obtained by the use of an ordinary thread protector which can be run up hand tight by whoever leaves the paper or ticket.

The container costs very little, can be installed in a few minutes by the welder, and provides a systematic means of handling field papers which ordinarily might be damaged or lost if carried in the pockets of field personnel.

HOW TO—Extend Lube Oil Line

Pumping units frequently have extension lines that simplify lubrication of the pitman bearings, such lines being lashed to the sides of the pitman and terminating in a grease fitting accessible to the pumper. A practice adopted by some operators, and one which further simplifies the work of servicing a pumping unit, consists of bringing another extension down from the stirrup bearing. This extension line, installed in the manner illustrated, requires no flexible joint, as it can be rigidly attached to the walking beam itself.

A vertical length of pipe or round bar is attached to the under side of the walking beam a short distance to the rear of the saddle bearing. The extension line is welded to the lower end of this bar. Such a system enables the pumper to lubricate all the upper bearings without climbing up on the walking beam, a factor that reduces working hazards, and enables him to cover more ground in a given work tour.



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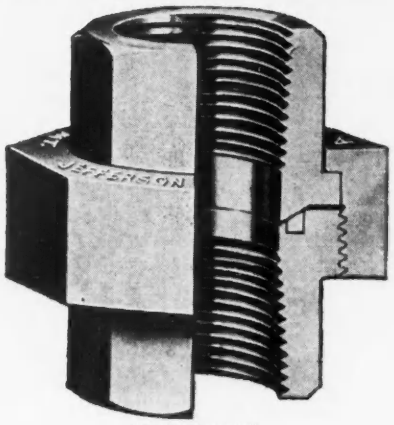

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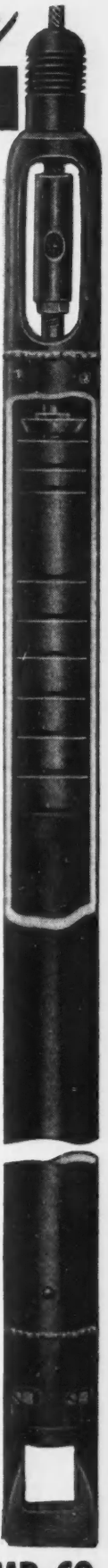

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HOW TO—

Group Sample Cocks In Protective Box

Producers whose property is near urban areas often find it desirable to take extra precautions to make sure that unauthorized persons do not tamper with production or gauging facilities. One company found it desirable to equip shipping tanks with a rectangular sheet metal box in which all sample cocks can be grouped, the cover being provided with a hasp for padlocking.

The box is designed to rest on the horizontal runs of several sample cock lines, round holes being cut in the back and front sides to accommodate the sev-

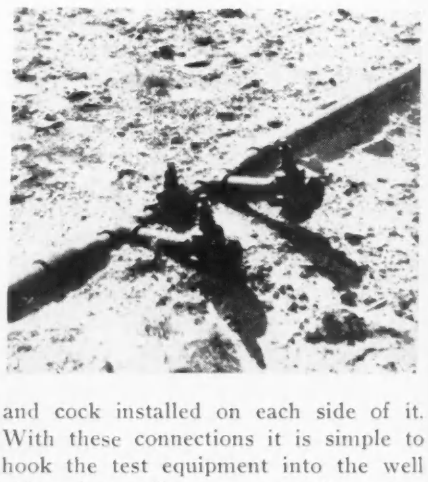
eral lines. The hasp projects through a hole in the cover, providing the simplest and most tamper-proof type of installation. This method of enclosing the valves, in addition to providing the above safeguards, enables the pipe line gauger to seal the valves with a single seal, instead of sealing the individual valves.

HOW TO—

Add Test Connection To Well Flow Line

In connection with the periodic checking and gauging of production from individual wells, one West Texas company equips each lead line with an installation similar to that shown. Instead of tying into the line either at the well or the tank battery where it may be difficult to set up the truck- or trailer-mounted test equipment, test connections are installed beside a road or other accessible point along the line, preferably as near as possible to the well.

The connections consist of a stop cock placed in the line, and a nipple



and cock installed on each side of it. With these connections it is simple to hook the test equipment into the well side of the line, connect the meter equipment discharge to the downstream side of the line, then close the main line cock. Production from the well then passes uninterruptedly through the test equipment and on into the line where it resumes its travel to the tank battery.

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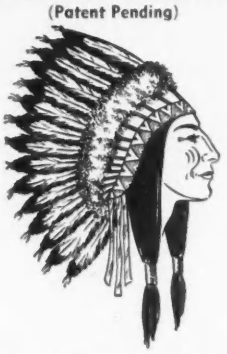

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Purification and Dehydration of Gases

By

C. L. BLOHM
Assistant Director of Research

and

W. F. CHAPIN
Process Engineer

The Fluor Corporation, Ltd., Los Angeles

VARIOUS TYPES OF equipment and processes for purifying sour gas are described, and recommendations made as to their use to meet specifications for different uses of the effluent. The authors evaluate glycolamine and monoethanolamine processes and outline uses for them in gas transmission purification setups.

AS THE demand for natural gas for domestic fuel has increased, the industry has drawn more widely on areas which do not provide naturally sweet gas. One of the largest present sources of natural gas is the West Texas-New Mexico area, which, however, yields gas containing appreciable quantities of hydrogen sulfide. In order to utilize such gas it is necessary that the hydrogen sulfide content be reduced to a very low value because of its toxic and corrosive nature.

Early developments in the treatment of gases for hydrogen sulfide removal were engendered by the need for such treatment on other than natural gases, and, in a good many instances, perhaps for rather specific purposes where the total quantity of treated gas required was relatively small. Earliest method used was the employment of lime, which was applied almost exclusively to the hydrogen sulfide removal problem until the later development of the so-called "dry box" or iron oxide process.[19]

The lime system had several objections, among which were high operating costs and the difficulty of disposing of the spent lime, so that it was rapidly replaced by the iron oxide process after the development of the latter. The iron oxide process was reasonably practical for many applications and had the advantages of being selective for hydrogen sulfide, regenerable by air oxidation, and capable of producing gas of high purity with respect to H_2S content. Incidentally, reference here and later to high purity will mean less than 0.25 grain H_2S per 100 standard cubic feet of gas. However, this system, when applied to large quantity treatment, is cumbersome in operation and quite impractical because of the large masses of treating material required, particularly when high pressure treating operations are involved. Furthermore, the handling of the spent beds is extremely hazardous because of the pyrophoric nature of the iron sulfide. Nevertheless, this system is still used to a considerable extent where it is necessary to meet stringent purity requirements under low pressure operations and where the total amount of hydrogen sulfide to be removed is small. A modification of the "dry box" method has been used in some cases in which aqueous slurries of iron oxide or other reagents have been used in a countercurrent absorption system, with or without regeneration, but this has found no wide application.

Several other methods of rather minor importance have been described but need only brief mention here. Refrigeration has been employed in some cases but obviously has considerable economic disadvantages in large scale operations. Simple water or oil washing has also been employed, but here the attainable purity of the treated gas is rather low and such methods could be used only for bulk removal where high purity is not a requirement.

In 1920 the Koppers Company introduced the Seaboard Process[22] of liquid purification and since that time this process has had wide application, particularly in the treatment of sour refinery or natural gases where the volume of gas treated and the total amount of hydrogen sulfide to be removed are large. This process, like all the more recent liquid purification processes, depends upon a cyclic system involving absorption of the impurities in a contacting zone followed by regeneration of the absorbing medium in a reactivation zone and recycling of the regenerated solution for further absorption. The Seaboard Process employs an aqueous solution of sodium carbonate in a concentration of about 3 percent and is regenerated by simple air blowing to remove the hydrogen sulfide. This system may be modified in detail for various processes. The principal modification involves means for the recovery of the

About the Authors

CLYDE L. BLOHM, assistant director of research for The Fluor Corporation, Ltd., received B.S. and M.A. degrees in chemical engineering from the California Institute of Technology and afterwards engaged in graduate work there. From 1931-42 he was in chemical and bacteriology plant operation and chemical engineering control work. Since joining Fluor he has specialized in chemical and chemical engineering research and research administration in the petroleum and chemical fields, including gas purification, sulfur manufacturing, gas cleaning, pulsation dampening, performance and process testing of commercial plants, including corrosion studies.

W. F. CHAPIN, process engineer for The Fluor Corporation, Ltd., graduated from the California Institute of Technology with a B.S. degree in chemical engineering. From 1941-44 he was employed by Permanente Metals Corporation in process design and technical service on carbothermic process for magnesium production, natural gas dehydration and purification, electrolytic hydrogen and oxygen and hydrogen manufacture from water gas. His work at Fluor includes process design of natural gasoline, cycling and pressure maintenance plants, liquid and solid bed dehydration plants, light ends and gas recovery plants, and gasoline plant instrumentation.

sulfur either as hydrogen sulfide, elemental sulfur, or, in some cases, sulfur dioxide. However, the purity of treated gas attainable by this process is not high and the economics are not too favorable.

The next process of any importance was the Thylox Process[8] which employs a solution of sodium thioarsenate for absorption of hydrogen sulfide, followed by reactivation by means of oxidation with air, the sulfur being recovered as elemental sulfur in a colloidal slurry. This process has the advantage of producing a marketable by-product sulfur, but, again, does not produce gas of extremely high purity. Other processes have been used to a limited extent employing such reagents as sodium phenate[20] or naphtholate or alkali salts of essentially weak inorganic acids, such as the borate system or the Shell tripotassium phosphate[15, 23] system, all of which depend for regeneration upon pH shift in the solution at elevated temperatures.

The Shell tripotassium phosphate process employs an aqueous solution containing about 30 percent of the salt. The system is more or less selective for H_2S in the presence of CO_2, but again high purity is difficult to obtain. However, by going to a two-stream cycle (the general principles of which, as applied to the amine process, will be described in more detail below) it is claimed an effluent gas of good purity can be produced, although still probably not adequate to meet the most stringent specifications. In addition, the steam requirements for this system are considerably greater than for a comparable amine system for any given set of conditions.

Several other systems have been employed abroad, particularly in Germany, which have found no great application to date in this country. One of these in particular is the so-called "Alkazid" Process[2] which uses as an absorption medium an alkaline salt of an amino acid such as glycine or alanine or derivatives thereof, or alkali phenates, depending on the application. Another of these which has found considerable application is the Staatsmijnen-Otto Process[16] which employs the oxidation-reduction system provided by a solution of Prussian Blue (ferriferro cyanide) with regeneration of the solution by air blowing and recovery of elemental sulfur.

All the above treating methods have certain disadvantages, principal among which are their inability to produce gas of extremely high purity, and, in general, high steam requirements where heat regeneration is used. Nevertheless, they have been used to a considerable extent in certain applications and in particular have utility in treatment of gas for engine fuel, etc., where purity requirements are not too high.

The above outlines very briefly the history and ramifications of the general field of gas treatment for hydrogen sulfide removal and brings up the most recent and widely applied process developments. It is the purpose of this article to discuss the latter in some detail.

Organic Amines

As an outgrowth of the various inorganic wet purification processes and the desire to increase efficiency and attainable purity, as well as to improve the economics of large quantity treating processes, R. R. Bottoms of Girdler Corporation investigated the application of certain organic amines to such processing. In 1930 he obtained a patent[3] which covered the use of a large number of organic amines for the removal of weakly acidic constituents from gases. However, the amines found to be most useful at that time and subsequently to date are in the class of the alkanolamines. Earlier operations employed aqueous solutions of diethanolamine or triethanolamine since these compounds were readily available commercially. Later, however, many of the applications employed monoethanolamine as it became available at sufficiently low cost to be suitable for such application. Monoethanolamine has considerable advantage from several standpoints over its secondary or tertiary homologs, among which are greater efficiency, high basic equivalence, and greater stability toward degeneration, particularly oxidative. However, diethanolamine is used in some applications where purity requirements are not too stringent. It does have the advantage, particularly in low pressure operations, of having a considerably lower vapor pressure than monoethanolamine, with consequent lower amine losses.

Based on the above application of aqueous amine solutions to gas treating, there evolved the combination Glycol-Amine Process described in the patent of A. J. L. Hutchinson in 1939.[10] This combination process offered some advantages over the previously used aqueous amine systems. The details of both processes will be discussed below.

Fundamentally, the principles of the organic amine process in either aqueous or glycol solutions are rather simple. Amines form compounds with hydrogen sulfide and carbon dioxide similar to those formed by ammonia. In the case of hydrogen sulfide, the compounds are the normal and acid sulfides. In the case of carbon dioxide, however, in addition to the normal and acid carbonates, there is the formation of organic carbamates analogous to the formation of ammonium carbamate with carbon dioxide and ammonia. In aqueous solution the percentages of normal and acid compounds, and carbamates where carbon dioxide is present, are dependent upon solution concentration, temperature and partial pressures of the acid gases. In glycol solution, the same general statement is true with the exception that the equilibria are shifted to some extent due to the decreased water activity. In either case, the equilibria between the individual constituents and the acid base complexes are reversed with increasing temperature, so that at the boiling point of the solution employed the acid gases are effectively driven out of the solution. Here again, however, the equilibrium conditions are considerably different in the glycol solutions as compared with the aqueous solutions, a fact which will be shown in the discussion below to be of considerable importance. However, consideration of the above basic principles indicates that amine solutions are readily amenable to use in cyclic proc-

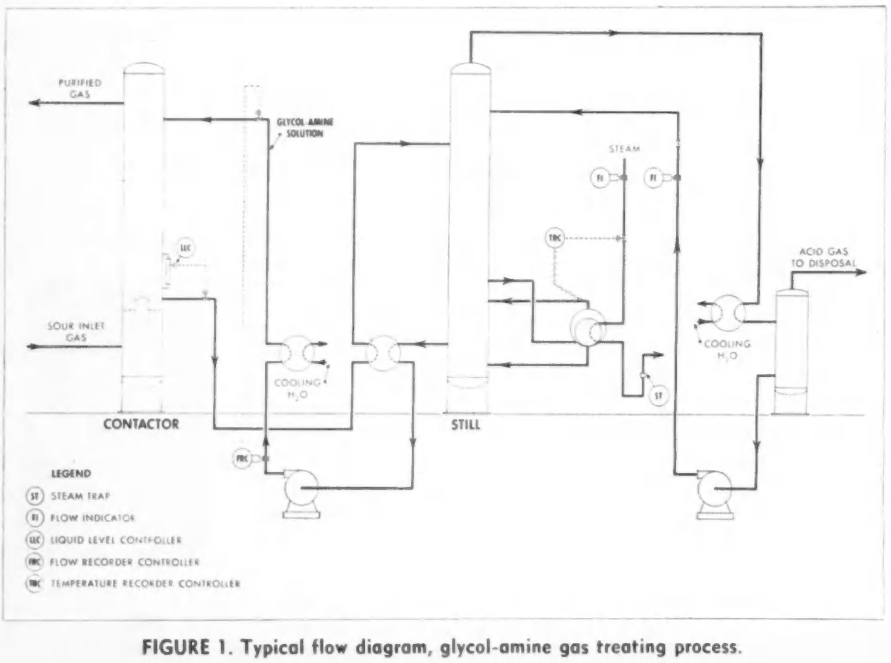


FIGURE 1. Typical flow diagram, glycol-amine gas treating process.

esses and have general characteristics which have made them eminently suitable for the treatment of large quantities of sour refinery and natural gases.

The general chemical properties of amines are analogous to those of ammonia in many respects, and in this regard it is of interest to point out that ammono-type complexes are formed readily with metals such as copper. Furthermore, the alkalinity of amine solutions, aqueous in particular, is sufficiently high to impart a considerable solubility to aluminum, etc. Because of these aspects, it is not possible to use copper or aluminum bearing alloys in amine treating plants, and the material of construction for vessels, piping and fittings is commonly carbon steel. Stainless steel is used rarely, except for special equipment such as orifice plates in meter installations.

The application of the Girbotol Process has been described by Bottoms,[4] Reed and Wood,[17] Gregory and Scharmann,[9] and others in several articles and, in some of these, reasonably detailed information has been furnished on the performance of specific plants. Similarly, Bacon[1] has described the early application of the glycol-amine process and more recently this process has been described in some detail by Chapin.[5] In addition, because of the general interest in the amine treating process, several people have investigated equilibria and other factors in some detail, particularly in aqueous solutions. Mason and Dodge[12] did a rather thorough study on equilibria involved in the carbon dioxide-aqueous amine systems at partial pressures of carbon dioxide up to one atmosphere, using mono-, di-, and tri-ethanolamine; and, Riegger, Tartar and Lingafelter[18] have investigated the equilibria between hydrogen sulfide and aqueous monoethanolamine solutions. Maloney,[11] and Cryder and Maloney[7] have published experimental chemical engineering data on the diethanolamine-carbon dioxide system in packed columns. At about the same time, Comstock[6] reported rather extensive data on packed column performance using alkali carbonate solutions for comparison with aqueous solutions of mono-, di-, and tri-ethanolamine. However, there is no published information on equilibria in amine-glycol solutions, and it has been necessary to obtain such information for design purposes by intensive investigation, both laboratory and pilot plant, in The Fluor Corporation. In this connection it is of some interest that, because of extremely high purity attainable in the treated gas by the use of the glycol-amine process, it has been necessary to develop specialized analytical techniques in order to evaluate the degree of treating. It has been necessary to guarantee a specification of not more than 0.25 gr. H_2S/100 SCF, or four parts per million, and precise analyses are essential in order to assure meeting this specification.

The chemical properties of ethanolamine solutions make them admirably suitable for a simple cyclic process. Aqueous solutions may be used for purification of gases, while glycol-amine solutions may be utilized for simultaneous purification and dehydration. While other amines have been and are being used in gas treating processes, this discussion will be limited to the application of monoethanolamine as typical and most widely employed.

Typical Flow

Figure 1 shows the typical flow of a glycol-amine gas treating plant. The sour gas is introduced at the bottom of the absorbing column, the contactor. The gas passes up through the bubble trays in the column where it is thoroughly contacted by the glycol-amine solution which enters at the top of the column, while the residue gas, freed of CO_2 and H_2S and dehydrated if desired, leaves the top of the column. The rich glycol-amine solution, containing the acid gases, leaves the bottom of the contactor and passes through conventional heat exchangers, where heat is exchanged with the hot lean solution; the then

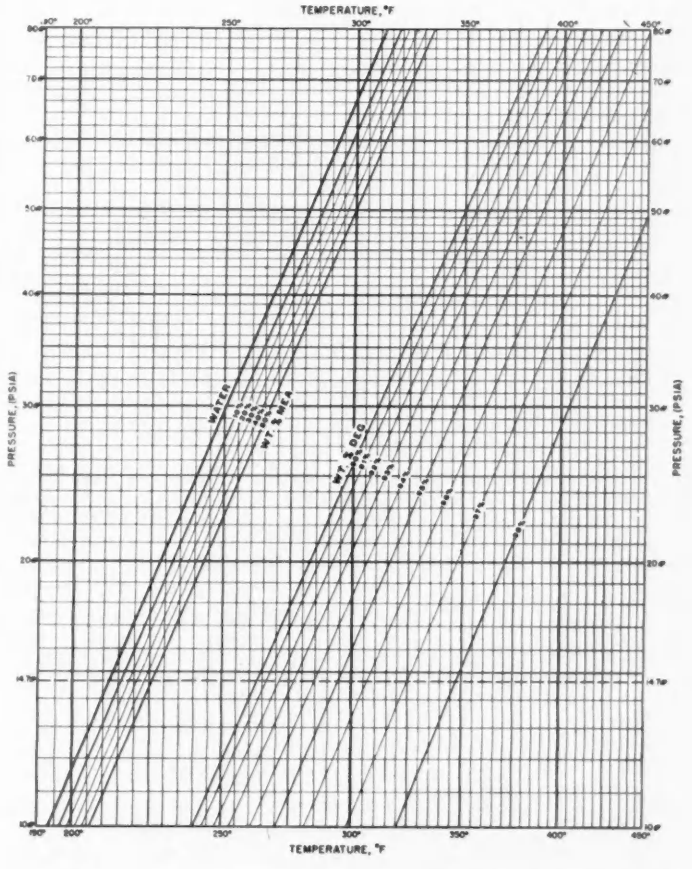


FIGURE 2. Vapor pressures of aqueous solutions of diethylene glycol and monoethanolamine.

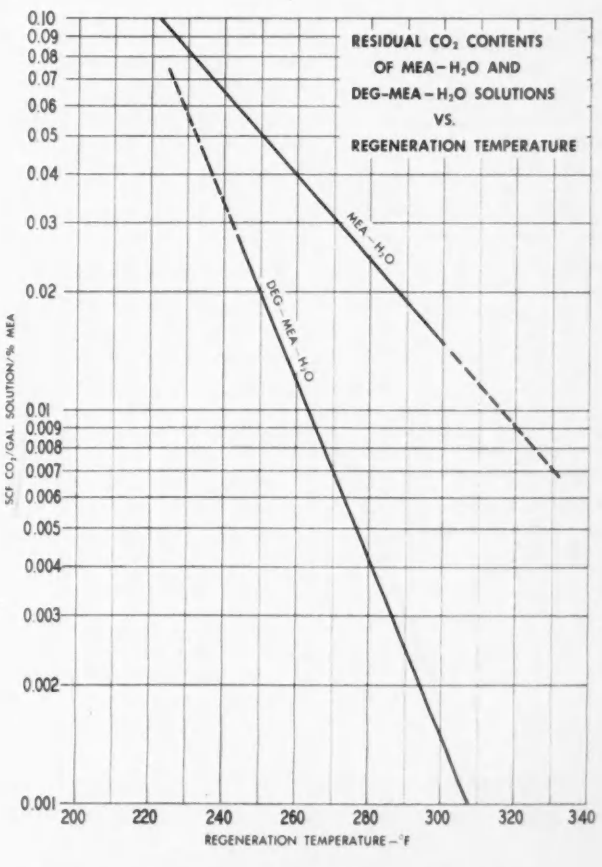

RESIDUAL CO_2 CONTENTS OF MEA – H_2O AND DEG-MEA – H_2O SOLUTIONS VS. REGENERATION TEMPERATURE
MEA – H_2O
DEG – MEA – H_2O
SCF CO_2/GAL SOLUTION/% MEA
REGENERATION TEMPERATURE – °F

FIGURE 3. Comparative stripping of CO_2 obtainable with aqueous amine and glycol-amine solutions.

heated rich solution is introduced into the regenerating column, the still. The solution passes down through the still where it is heated further and stripped of its acid gas content by contact with the rising vapors in the column; the solution leaving the bottom tray is boiled in a reboiler to provide the stripping vapor.

The overhead steam and acid gas stream from the still passes through a reflux condenser, and the resultant mixture is separated in an accumulator, the acid gases leaving the top of this vessel and the water condensate being pumped to the top of the still as reflux. The regenerated lean glycol-amine solution leaves the bottom of the still, passes through the exchangers and is pumped through coolers back to the top of the contactor, thus completing the cycle.

It should be pointed out here that, although the contactor, still and auxiliary equipment employed are conventional, the process involves chemical reaction and not physical absorption. This fact results in low equilibrium vapor pressures, so that few equilibrium contacts are required. However, the attainable purity of the treated gas with regard to H_2S, is controlled by one of two variables, i.e., first, the contactor efficiency, and second, the equilibrium vapor pressure at the top of the contactor must be less than that determined by the purity requirement. In regard to the latter, it is obvious that the minimum H_2S vapor pressure at the top of the contactor is fixed by the H_2S content of the lean solution, and is controlled, therefore, by the effectiveness of the stripping operation. The stripping will be discussed below in more detail.

As shown on this flow sheet, the steam to the reboiler is controlled by the temperature in the reboiler, while the reflux to the still is flow controlled, either manually or automatically. This method of control proves satisfactory, as a small change in the water content of the solution results in a significant temperature change in the boiling point of the solution. This is illustrated in Figure 2, which shows the vapor pressure of diethylene glycol solutions plotted against temperature. Although the presence of monoethanolamine changes the actual temperatures somewhat, it may readily be seen that temperature is the most satisfactory variable to use in controlling the composition of the solution.

Typical Flow Scheme

The typical flow scheme for an aqueous amine plant is the same as that shown for a glycol-amine plant, the only difference being that the steam to the reboiler is flow controlled, while the reflux is controlled by a level controller on the reflux accumulator. In this case the boiling point temperature change with a change in composition is not sufficiently sensitive for the use as a control variable. This fact is also shown in Figure 2 by the lines showing the change in vapor pressure of aqueous monoethanolamine solutions with temperature.

The prime difference between the use of an aqueous amine solution and a glycol-amine solution, other than the dehydrating effect of the latter, lies in the mechanism of regenerating the solution. Since the absorption of H_2S and CO_2 in monoethanolamine solutions involves a chemical reaction, regeneration of the solution involves a reversal of this reaction. As mentioned above, the maximum purity obtainable on any gas being treated is a function of the pressure and temperature at the top of the acid gas absorption column and the amount of the acid gases remaining in the stripped lean solution. Any H_2S or CO_2 remaining in the solution will exert a certain vapor pressure at the top of the absorber, with an amount of H_2S and CO_2 equivalent to this vapor pressure being the minimum that can leave the top of the column in the treated gas. Thus, the degree of regeneration or stripping of the solution obtained in the regenerating column will determine the maximum purity or the minimum possible content of H_2S and CO_2 in the treated gas leaving the top of the absorber.

Normally, an increase in pressure is detrimental to any stripping operation; however, an increase in pressure with a corresponding increase in the boiling point of an aqueous monoethanolamine solution permits more complete regeneration of the solution as far as CO_2 is concerned. This phenomenon results from the fact that dissociation of the monoethanolamine-carbon dioxide complex, which is by no means complete at the atmospheric pressure boiling point of the solution, increases rapidly enough with temperature to overcome the adverse effects of the increased pressure on the stripping. On the other hand, this is not the case with H_2S and an aqueous monoethanolamine solution. The monoethanolamine sulfide is substantially dissociated at essentially the atmospheric pressure boiling point of the solution. Thus, the benefits of increased temperature are not sufficient to overcome the adversities of the increased pressure, and the stripping of H_2S is hindered at elevated pressures. Therefore, when pressure regeneration is used for aqueous monoethanolamine solutions, with the regenerating column maintained under pressure ranging up to 50 pounds per square inch gauge, the total amount of acid gas remaining in the stripped lean solution is markedly reduced in cases where there is an appreciable ratio of CO_2 to H_2S in the rich solution. Nevertheless, although the actual quantity of H_2S remaining in the solution is less than that of CO_2, the H_2S content may actually increase with increasing regeneration pressure. In general, however, the net result of pressure regeneration is a decrease in total acid gas content of the stripped solution.

In contrast to the above, the use of a glycol-amine solution raises the regeneration temperature without pressure increase, and further, the presence of the glycol has a beneficial effect in the stripping equilibrium. Consequently, the adverse effects of pressure regeneration are not encountered, and both H_2S and

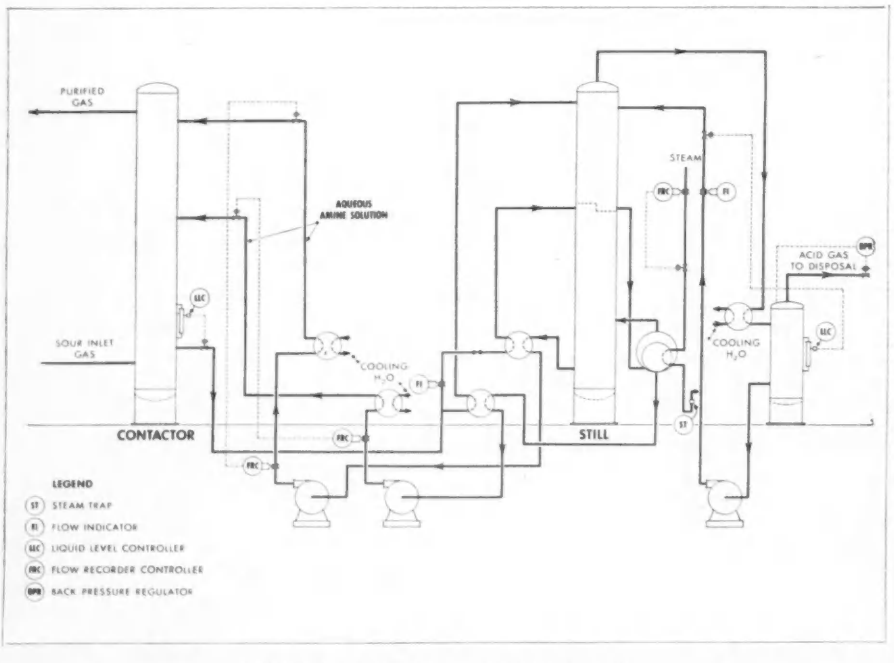
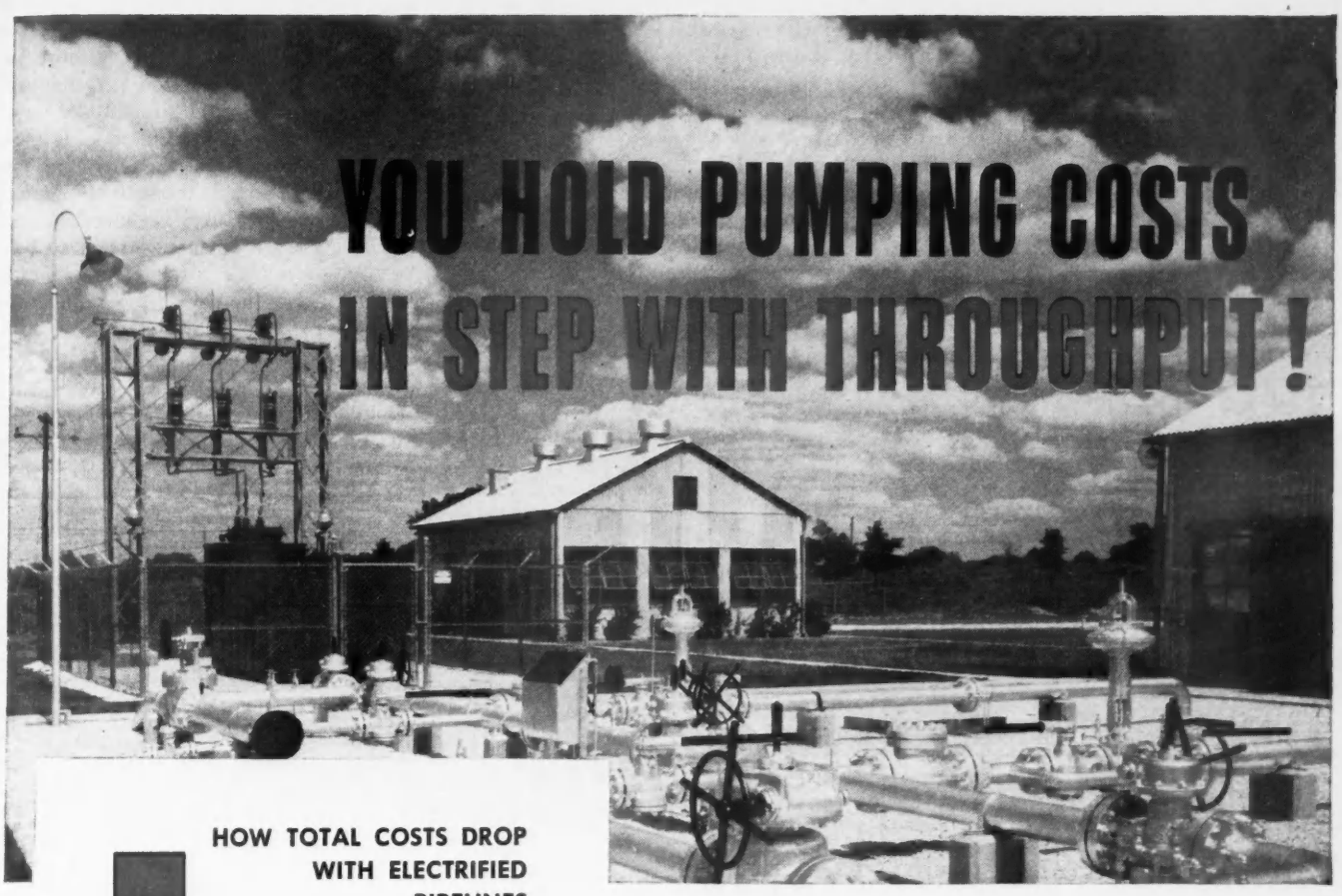


FIGURE 4. Aqueous amine split-stream cycle.



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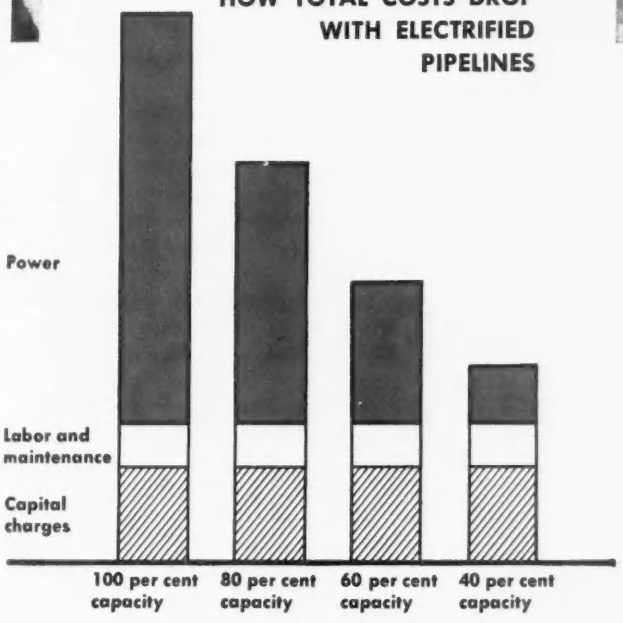

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CO_2 can be stripped essentially completely. This feature constitutes one of the most important advantages of the glycol-amine system.

Comparative stripping results for CO_2 obtainable with aqueous monoethanolamine and monoethanolamine-glycol solutions are shown in Figure 3. The MEA-H_2O line, showing the effects of pressure regeneration, is based on data published by Reed and Wood.[17] The glycol-amine data (DEG-MEA-H_2O) are derived from operating plants and a pilot plant. The latter show the effect of varying the amount of water in a glycol-amine-water solution.

The difference in behavior of H_2S with the two solutions is even more pronounced than that of CO_2. Although the actual quantity of the residual H_2S is less than that of CO_2 for either solution, the divergence of the MEA-H_2O and the DEG-MEA-H_2O lines for residual H_2S content is considerably greater than that shown for CO_2.

In any event, it is obvious that any acid gas remaining in the lean solution is combined with an equivalent amount of amine, which means that sufficient excess solution must be circulated to compensate this residual. Solely on the basis of circulation requirement, then, any device which results in better stripping offers some advantage, and may be procured by either pressure regeneration of aqueous solutions or the use of glycol solutions. Again it should be pointed out, however, that the resulting attainable purity of treated gas may not be the same in both cases, due to the adverse effect of pressure on H_2S regeneration.

Under any pressure in the regenerating column more complete stripping of both CO_2 and H_2S may be accomplished by more severe boiling of the solution. Increasing the quantity of stripping vapor decreases the partial pressure of acid gas above the solution and thus reduces the equilibrium amount of acid gas remaining in the solution. It is pertinent that to obtain the stripping of CO_2 from an aqueous monoethanolamine solution by pressure regeneration as shown in Figure 3 it is necessary to boil the solution more vigorously to generate more stripping vapor in the regenerating column than is required to obtain the stripping shown for glycol-amine solutions. With equivalent amounts of stripping vapor the divergence of the lines shown would be greater, as would be the initial distance between them. The lines shown represent approximately the economic degree of stripping for each particular solution.

A glycol-amine solution would then have a distinct advantage over an aqueous amine solution when employing a flow cycle similar to that shown in Figure 1. As the solution does not have to be boiled as severely during regeneration, and as the circulation rate may be somewhat lower in many cases, the saving in steam consumption and cooling water circulation is considerable.

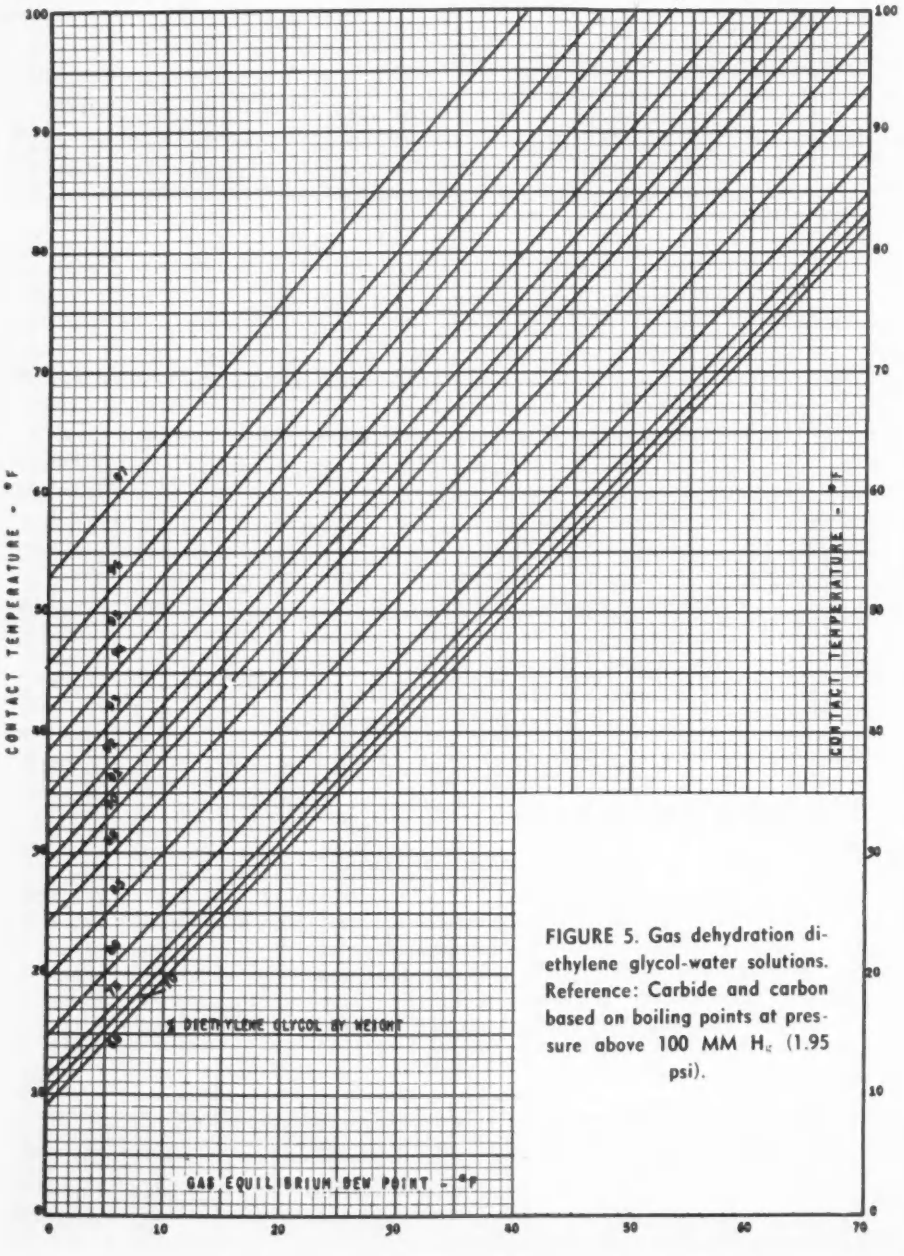

FIGURE 5. Gas dehydration diethylene glycol-water solutions. Reference: Carbide and carbon based on boiling points at pressure above 100 MM H_g (1.95 psi).

Two-Stream Flow Cycle

However, a two-stream flow cycle may be used in the case of an aqueous amine solution which will reduce the utility consumption to a point more comparable to that of a glycol-amine solution. This arrangement is shown in Figure 4. The rich solution from the bottom of the absorber is split into two streams, half going to the top of the still and half to the middle. Just above the point at which the middle stream is introduced to the column, the stream to the top section is drawn out, and then flows to the reboiler. This upper stream, which would not be regenerated to the same degree as that in a normal single stream plant, then flows through exchangers and coolers to the absorber, where it enters several trays down from the top. The vapors from the reboiler rise from the bottom of the still, contacting the downflowing solution which was introduced in the middle of the column. Although the actual quantity of vapor rising in the column is less than for a normal single stream plant, it is contacting only half the volume of liquid flow, so the solution leaving the bottom of the still is then more completely stripped of acid gases than that of a single stream plant. This stream is then introduced into the absorber on the top tray.

This two-stream principle, employing a "lean" and a "very lean" solution, has been used in several gas treating processes, such as Shell's tripotassium phosphate process, and was first disclosed by Shoeld.[21] Although this two-stream ap-

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plication of an aqueous amine solution saves utilities, the initial cost of the treating plant itself is increased. The still itself obviously has a higher cost as more trays are required, and the two streams require two piping systems with two sets of exchangers and coolers.

It then becomes obvious that higher purities are obtainable by the use of a glycol-amine solution than by an aqueous monoethanolamine solution inasmuch as the glycol-amine solution may be stripped much more completely of the absorbed acid gases. This is particularly important when considering the cases where extremely low H_2S quantities are specified for treated gas. A difference of but a few grains of H_2S remaining in the regenerated solution can mean the difference in meeting or not meeting a specified gas purity.

As previously mentioned, the glycol-amine process was originally developed to accomplish simultaneous acid gas removal and dehydration of a natural gas stream. It was found in the earliest application that a glycol-amine solution with the same water content as a diethylene glycol solution will dehydrate the gas to a slightly greater degree than the latter.

Figure 5 shows the dew-points obtainable with various concentrations of diethylene glycol solutions at various contact temperatures. Although glycol-amine solutions give slightly better dehydration, this same chart may be used for estimating attainable dew-points with such solutions. Dew-point depressions of 50° F., i.e., the water dew-point of the purified and dehydrated gas is 50° F. less than the contactor outlet temperature of the gas, may be reached economically by use of glycol-amine solution.

In the above discussion of dehydration, the term "dew-point" is used, since this terminology is common in the industry. However, reference to "dew-point" of effluent gases from liquid dehydrators has no significance when used to evaluate the water content of such gases. The gas leaving the top of a contactor has approached equilibrium with the solution on the top tray at the temperature and pressure conditions existing, so that any decrease in temperature will result in condensation of liquid from this gas, the composition of which will be approximately the same as that of the top tray liquid. On the other hand, effluent gas from a solid bed, non-volatile dehydration will contain only water, so that then a dew-point measurement is a true indication of water content. It is obvious, therefore, that in liquid dehydration systems, the precise terminology should employ absolute water content determined by other than dew-point measurements, which give completely erroneous results, the value obtained being a function solely of the operator and means of procedure. In this connection, it should be pointed out that dehydration of transmission gas is employed principally to prevent possible hydrate formation, and, since the gas from glycol-amine plants contains small amounts of these chemicals, the actual hydrate formation point can be suppressed below that corresponding to the water content of the gas alone. This effect offers some advantage in either glycol or glycol-amine dehydration, the advantage being greater in the latter case.

One important factor to consider in the design of a glycol-amine plant is the temperature approach at the top of the contactor between the outlet gas and the inlet lean solution. The heats of reaction of H_2S and CO_2 with monoethanolamine are considerable, and in an improperly designed plant can cause the outlet temperature of the gas to be sufficiently high to interfere with proper dehydration. The dew-point depression would be normal, but the outlet temperature of the gas might be 100° F. instead of a desired temperature of 80° F., causing an almost corresponding increase in the dew-point.

The combination glycol-amine solution for simultaneous purification and dehydration may not always be the best answer where both results are desired, the most economical choice being dependent on many factors. In many cases, particularly where the treating requirements are not rigid, a purification plant using an aqueous amine solution followed by a separate dehydration plant utilizing a straight diethylene glycol solution might prove to be the most attractive answer.

Two-Stage Cycles

The glycol-amine process also lends itself readily to two stage cycles, wherein the gas is treated and partially dehydrated in the first stage and dehydrated in the second stage. These cycles are particularly applicable where it is desired to treat the gas at a certain pressure prior to compressing the gas for transmission, with the dehydration step taking place at the final pressure.

One such scheme circulates a glycol-amine solution containing 15 to 25 percent water in the equipment shown in Figure 6, with the principal lean solution stream entering the contactor a few trays down from the top. A small side stream is taken from the reboiler to a small reboiler, wherein it is concentrated to about 5 percent water. This small stream, after being cooled, is then introduced to the top tray of the contactor. As mentioned in the preceding paragraph, the top few trays of this contactor could actually be another small contactor operating at higher pressure.

Another cycle that may be employed has been described by McCartney[14] and is shown in Figure 7. As above, the main solution treating stream might be a glycol-amine solution containing 15 to 20 percent water. In this case the small concentrated stream is kept separate from the more dilute treating stream by a chimney tray in the contactor, and passes through its own small exchangers, coolers, and reboiler, the vapors from the latter being discharged into the main treating section still. This cycle has an added advantage of substantially reducing vaporized amine losses from the plant. The monoethanolamine builds up to a certain extent in the concentrated solution, but most of it is vaporized in the small reboiler and returned to the

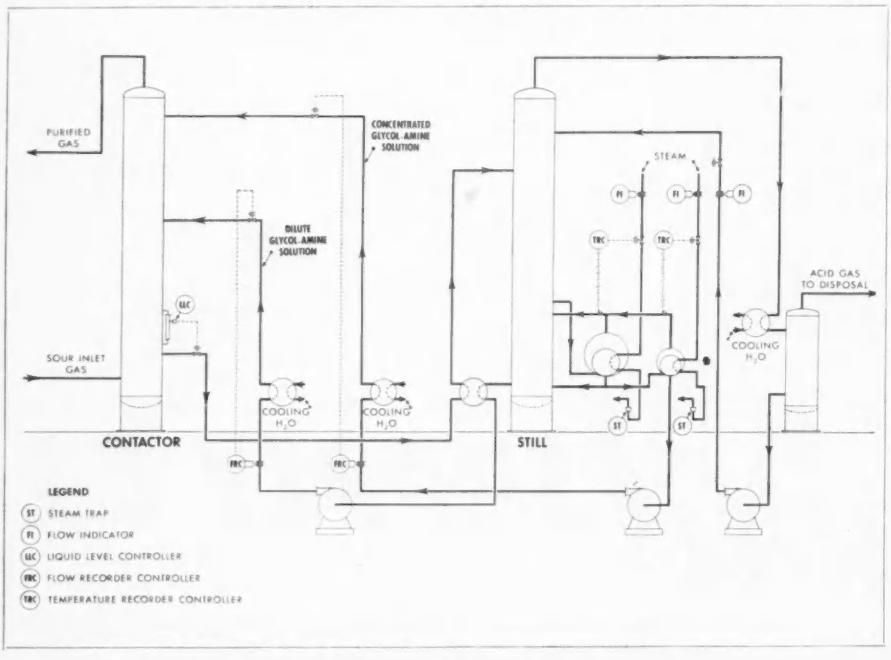

FIGURE 6. Glycol-amine commingled two-stream cycle.

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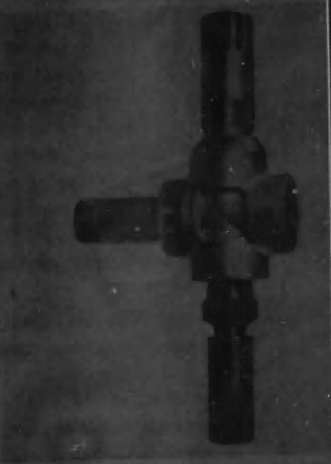

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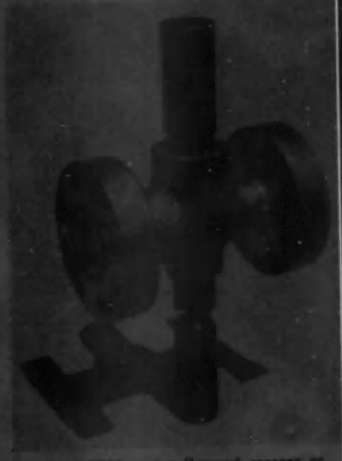

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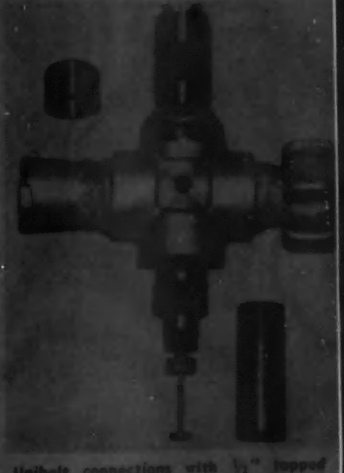

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main treating solution in the still. Again, the top section of the contactor could be a separate vessel operating at a higher pressure.

The use of a dilute glycol-amine solution in such cases has distinct economic benefits. For simultaneous treating and dehydration a glycol-amine solution containing approximately 5 percent water is used, but, where the job may be done more economically in two steps, or where purification only is desired, the more dilute solution may be used to advantage. The treating requirements set the tolerable amount of acid gas remaining in the lean solution, which then sets the required regeneration temperature, and this in turn sets the water content of the solution. The more dilute glycol-amine solution then has a lower viscosity which results in higher heat transfer rates. The regeneration temperature is less than that of the concentrated solution, thus reducing the heat load on the exchangers and decreasing the reboiler surface by increasing the mean temperature difference between the solution and the heating steam, or, if desired, permitting the use of lower pressure steam.

Typical solution compositions employed in the glycol-amine process may be comprised of from 10 to 30 percent monoethanolamine, 45 to 85 percent diethylene glycol, and 5 to 25 percent water.

No generalization can be made as to the most economical selection of one of the amine type processes to accomplish purification of a gas stream or to obtain both purification and dehydration. However, an aqueous monoethanolamine solution can usually be used to advantage where the specifications for the treated residue gas are not stringent. This is particularly true of cases where the prime emphasis is on recovering CO_2 or H_2S for further use rather than on the purity of the treated gas.

But the advantages of the glycol-amine process become more prominent as the treating requirements become more rigid, principally because of the fact that glycol-amine solution may be stripped so completely and so readily of CO_2 and H_2S, especially the latter. However, as is always the case in comparison of two processes, advantages are associated with some disadvantages. A glycol-amine solution is subject to lower heat transfer rates than an aqueous amine solution because of its higher viscosity, necessitating more heat transfer surface, and the cost of the initial charge of diethylene glycol for the plant solution may prove to be a sizable item, even though the operating losses of this constituent are normally negligible. On the other hand, with an aqueous amine solution it is necessary to go to a more complicated two-stream arrangement to meet some purity requirements and to save in operating utilities, necessitating additional equipment, and some purity specifications cannot be met economically by such a device.

Dehydration

Where dehydration is also required, the same comments apply as for purification only, and the choice is further complicated by the fact that more alternate schemes are available to accomplish the desired results. Separate plants, dilute and concentrated glycol-amine streams, or a concentrated glycol-amine stream with a low water content to obtain the results simultaneously might be the best answer. The choice would be dependent largely on the purity required in the treated gas and on the size of the required treating plant. However, if the necessary treating plant size is small, it is obviously most economical to obtain both results simultaneously, rather than use separate plants or separate streams, one for purification and one for dehydration.

The initial investment and operating costs of a purification plant or of a purification and dehydration unit likewise are not subject to generalization. In addition to the size of the treating plant and the specifications for the treated gas, many other factors are involved, including the absorption pressure and the composition of the sour gas.

The industrial application of the glycol-amine process is becoming increasingly important. To the best of the authors' knowledge, utilization of this particular process first made it feasible to remove H_2S from gas by amine treatment with complete assurance that the residue gas would be sweet to the Bureau of Standards' lead acetate test.[13] This, in turn, led to the possibility of treating sour gas and transporting the purified gas to areas short of fuel and having high purity requirements regarding the H_2S content of the gas.

The outstanding example of this application is the project put in operation by the El Paso Natural Gas Company to transmit originally sour gas from the West Texas-New Mexico fields to Southern California. And at the same time this is undoubtedly the outstanding example of mass purification of sour natural gas, and more particularly of the large scale use of a single type treating process.

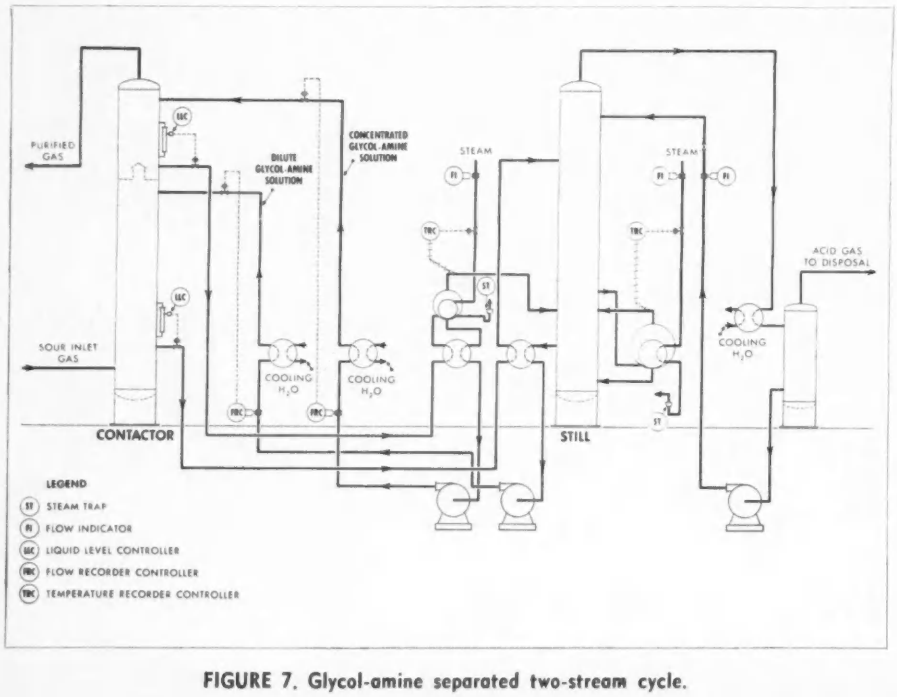

FIGURE 7. Glycol-amine separated two-stream cycle.

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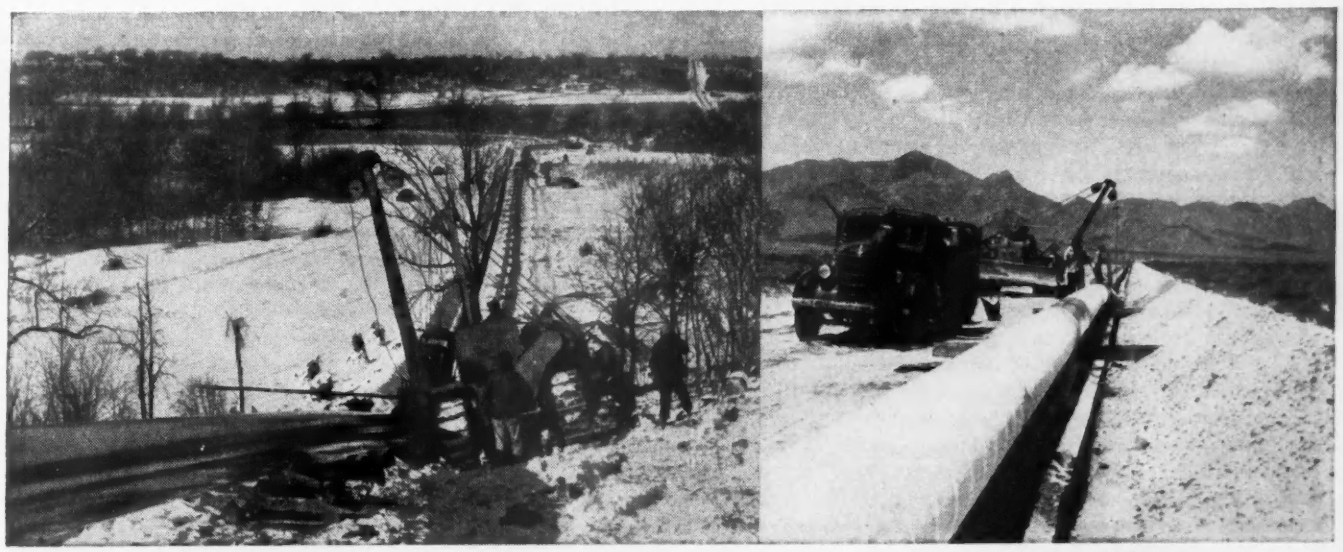

Above: Midwinter in Pennsylvania—Barrett A. A. Enamel will not crack at -20° F.
At right: Midsummer in the Arizona desert—Barrett A. A. Enamel will not flow, even at 160° F.

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Results in Experiments with *Pulsation Eliminators*

By DAVID J. MASSON
Professor of Hydraulic Engineering, Ohio State University

THE AUTHOR OUTLINES a series of experiments run with equipment designed to permit evaluation of the effect of pulsations in an air or gas stream on the accuracy of the indications obtained from an orifice meter. This article has been condensed from a paper presented before the Ninth Annual Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, W. Va.

PULSATION constitutes a serious factor contributing to inaccurate gas measurement; and this factor is even more apparent when the meter station must be located close to the compressor station where the flow through the meter is not steady, but is pulsating.

In order to understand exactly why a meter subject to pulsating flow will be in error it is necessary only to study the elementary theory of fluid meters very briefly. In starting out to develop the formula for flow through an orifice meter, the first assumption is that the meter is operating in a "steady flow process;" that is, the amount of gas entering the meter at any given time is exactly the same as that leaving the meter at the same time. In the case of most meters this is so nearly true that the meter constants developed from the elementary theory and the calibration of similar orifices can be used to compute the flow through the meter with a very high order of accuracy.

However, in the case of a meter close to the discharge of a compressor, the flow is far from steady. For purposes of study, assume that a single cylinder compressor is running at 30 revolutions per minutes. To make the worst possible case, let the compressor be single acting. In this case, the compressor would be on the suction stroke for one second and there would be no flow through the meter; and on the discharge stroke the flow through the meter would persist only for a small fraction of a second depending on the suction and discharge pressures. Under these conditions the meter will not give accurate readings because it is not a steady flow device and the formulas and constants derived for steady flow will not apply.

In addition to the above conditions of operation, valves do not open and close gradually, but will open rather quickly and close in the same way. When this happens, pressure waves are set up which are of the same order of magnitude as very low frequency sound waves. These waves will travel along the pipe with the velocity of sound in the gas flowing. These sound waves will be decreased in intensity by passing through the orifice of the meter so that the pressure produced by them will be different on the two taps of the orifice and the readings of the differential gauge will not be the true readings due to the flow of the gas through the orifice, but will be different due to these sound waves. Since the mercury in the differential gauge has considerable inertia, the differential pen will not follow the rapid changes in the true pressure. In most cases the meter will read high.

In the case of actual flow measurement at a normal compressor station it will be found that because of a large number of cylinders and a higher running speed, the flow through the meter will be more nearly constant, and as a result the steady flow assumptions may give results which are approximately correct, though the deviations from these results are variable in amount and may amount to a relatively high percentage so that measurements made with pulsating flow will not be accurate enough.

Thorough Survey

In all cases where pulsation is suspected, a survey of the installation should be made with a "pulsameter" to determine if the measurement is in error. This survey should be as complete as possible, covering all rates of flow and static pressures to be encountered in normal operations, as well as all compressor combinations.

Figure 1 shows the results of such a survey on a repressuring station. It will be noticed that, for this particular station, the meters are within limits of commercial accuracy if the operating differential is greater than 30 inches of water. In this particular case the measurements would be satisfactory if it would be possible to operate at high differentials at all times.

If such a survey is conducted and it is found that the pulsation is so bad that no measurements can be made accurately, it will be necessary to make changes in the meter setting to eliminate some of the pulsation effect.

The earlier tests have shown that errors can be decreased by increasing the differential pressure across the orifice and by increasing the orifice to pipe diameter ratio. Increasing the differential has a much greater effect than does changing the diameter ratio, and so an orifice of larger diameter should not be installed in a given size runway to eliminate pulsation error. This will have the effect of increasing the error. If it is possible to install a smaller diameter meter runway with a smaller orifice in it, so as to increase both the differential and the diameter ratio, then in many cases it will be possible to make the meter operate satisfactorily from a pulsation standpoint.

In many cases the pulsation error will be so great that it cannot be eliminated by these methods. Realizing this fact, the next step is to determine other methods of eliminating the pulsation.

It is realized that the effect of pulsation can be eliminated by the use of a throttling device, by use of relatively large volumes between the compressor and the meters, or by a combination of these. Throttling, however, may be a very expensive way of eliminating the error since it will increase the total pressure against which the compressors are operating and so increase the first cost and the operating cost of the compressor station.

The use of volume chambers to absorb the pulsations is usually too expensive since the volumes are rather large and are costly to install. It is probable, however, that if the volume is properly designed as far as shape and size are concerned, it may be possible to build an eliminator which will make it possible to get accurate measurements at a relatively small cost. Some tests on a device of this sort will be discussed a little later in this paper.

No device of this sort should be designed or constructed without a careful

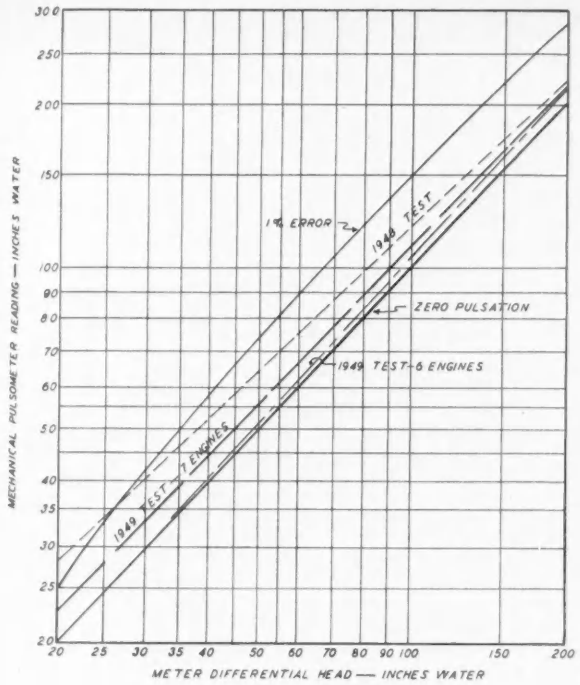

FIGURE 1. Preliminary pulsation error limit chart for flange and pipe taps.

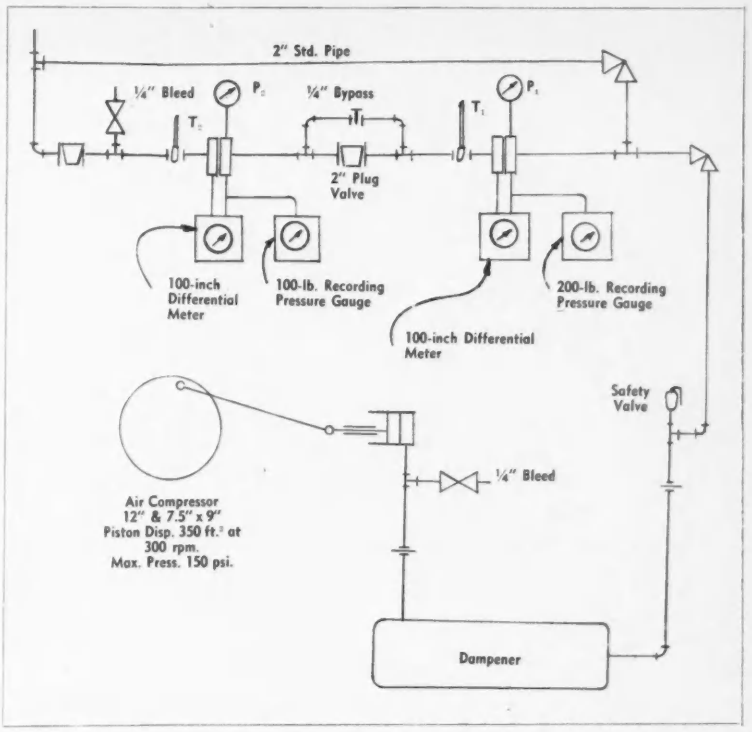

FIGURE 3. Piping diagram of meter runs for pulsation experiments at Ohio State University.

study of the particular problem, as to compressor size, speed and number, types of aftercoolers, piping arrangements, etc. A well-trained engineer or physicist can, with the necessary data, design a device which will theoretically remove the pulsation waves with a minimum of cost. Before these devices are accepted for use it will be necessary to conduct tests to determine the effectiveness of each particular device.

For instance, it is theoretically possible to put a branch pipe between the compressor and the meter of such a length that the distance between the blind end of the pipe and the main line is one-quarter of the wave length of the pulsation wave, and then the reflected wave will return to the main line so out of phase with the primary wave that it will eliminate the pulsation error. This piece of pipe in most cases would be of excessive length, and it is possible that some fraction of the wave length would serve satisfactorily. The Ohio Fuel Gas Company has designed a short pipe eliminator with a movable piston at its end. This is to be used as a tuned eliminator making the length of the pipe some fraction of a wave length and then determine by test if the pulsation has been eliminated. This device has been installed at a compressor station and seems to improve conditions considerably.

One device has had considerable adoption by the gas industry for eliminating the vibration in piping as well as meter error. This is a combination of friction loss and volume type described previously. One such dampener was loaned to The Ohio State University for tests

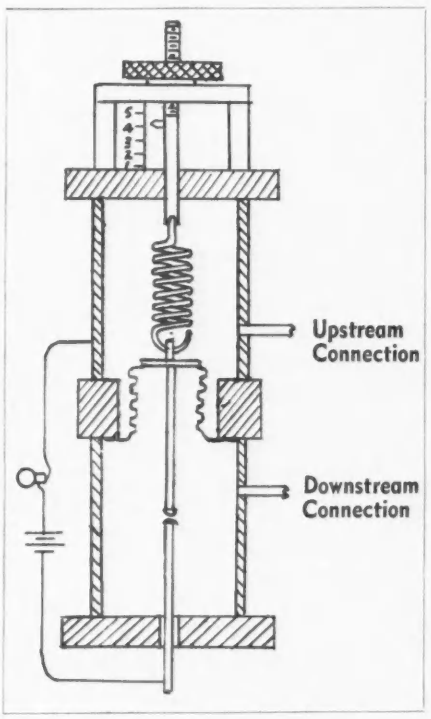

FIGURE 2. Sketch of pulsameter.

to determine its effectiveness and some tests have been conducted. The tests seem to indicate that these dampeners are effective as long as they are used within the conditions for which they were designed.

The eliminator was designed for use with an air compressor which is used for student laboratory testing. This compressor has a capacity of 300 cubic feet per minute of free air at 125 pounds per square inch gauge discharge pressure when running at 300 rpm. It is a two-stage compressor without an aftercooler with the discharge through the eliminator, through a large storage tank or directly into the discharge line. The discharge line was connected directly by two 2-inch orifice meter runs in series, with a plug type valve between the two for throttling the flow so that there will be no pulsation on the second meter run.

The differential pressures were read by the use of 100-inch recording meters. The static pressures were read on 100-pound recording pressure gauges. The temperatures were read by thermometers in wells directly behind the meters so as not to affect the flow through the meters.

The test procedure was to install orifices in the two meter runs and then run a series of "unity" runs with the outlet valve to the orifice line throttling to the critical pressure so that there was no pulsation effect on either of the meter runs. This procedure would eliminate the effect of any differences in installation or manufacture of orifices and give a standard comparison between the meters with which any change due to pulsation might be compared. After the "unity" runs were made, the meters were then connected directly to the compressor outlet and a series of tests were run with maximum pulsation on the inlet meter. When these runs were completed the flow was adjusted through the eliminator and the series of runs repeated.

The runs using the eliminator were

CONTINUED ON PAGE 268

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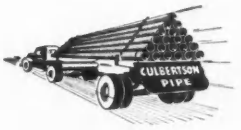

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Design of HEATERS to Eliminate Freezing and Hydrate Formation

By H. RAY WORTMAN
Gas Engineering Assistant, Consumers Power Company

BEFORE it is possible to design a heater to accomplish the task assigned, i.e., eliminate freezing and formation of hydrates, we must investigate the nature of the freezing that occurs in natural gas lines and understand something about hydrates.

The subject of gas hydrates has only in recent years been investigated to any great extent. Prior to the early 1930's, any freezing was thought to be ordinary water-ice and brought about by some localized condition which reduced the temperature to the necessary 32° F. In 1934 E. G. Hammerschmidt published one of the first comprehensive articles on gas hydrates and their importance in gas transmission. Since that time, through the efforts of various investigators, our knowledge has been greatly increased on this subject although it is still far from exact and much of it is qualitative instead of quantitive.

Chemically, gas hydrates appear to be compounds similar to hydrated salts such as $CuSO_4 \cdot 5H_2O$. Each individual component of the gas, such as ethane, methane, nitrogen, etc., does not form its own hydrate, but rather the hydrate formed is a homogeneous mixture of all components. If "R" is used to represent the natural gas composed of its several constituents, the gas hydrate would be chemically represented as $R \cdot x\,H_2O$. The value of "x" varies from 6 to 18 but 9 is believed to be an average for natural gas.

Physically, gas hydrates are light and porous, and have much the appearance of snow when obtained from a depressured pipe line. Their exact state in the pipe line under pressure is not quite known. Tests using glass-windowed apparatus indicate that they vary according to manner formed. At pressures below 75 pounds per square inch gauge, hydrates do not form, but water-ice will form at 32° F.

Hydrates are formed at pressures in excess of 75 psig when the gas is saturated with water vapor at the existing temperature. There is a maximum temperature at which hydrates will form, regardless of saturation. This temperature increases with pressure, but probably never exceeds 80° F. The exact conditions vary with the particular gas used. After establishing the particular gas to be handled, there are three variables that affect hydrate formation. They are pressure, temperature, and amount of water present in the gas. It is possible by varying one or more of these variables to form or eliminate hydrates.

Hydrates form when the gas contains the maximum amount of water vapor that it can have at the existing temperature and pressure, and generally in presence of liquid water. For many years this amount of water was determined by applying the law of partial pressure and using water data obtained from steam tables. Recent experiments have shown that these data are not accurate, especially as the pressure increases. The gas carries more water than theoretical considerations indicate. For instance, at 600 psi gauge and 60° F., it theoretically requires 19.8 pounds of water vapor per Mmcf to saturate it. However, actual experiment has determined that the value is closer to 25 pounds per Mmcf, varying somewhat with the composition of the gas.

The accurate prediction of hydrate forming conditions of temperature and pressure is only possible by experimenting with the particular gas involved. W. M. Deaton and E. M. Frost, Jr., U. S. Bureau of Mines, in investigating hydrate formation of a particular gas, found that at 500 pounds, hydrate formed at 56° F., but indicate the probable limits of hydrate formation at 500 pounds as varying from 49° to 61° F. A particular gas used by our company forms hydrates at 51° at 500 pounds.

The most obvious way of preventing freezing and hydrate formation is eliminating the water by dehydrating. Adding alcohol or ammonia will reduce hydrate forming tendencies and keep the water from forming a hydrate. The continuous addition of alcohol or ammonia is not generally economical, nor is it desirable from an operating viewpoint.

Where dehydration is not possible, we must consider the addition of heat to keep gas temperatures high enough to prevent freeze-ups. The use of heaters is generally economically feasible only at local points such as regulator stations, meter stations and well-heads.

We are all familiar with the refrigerating effect of rapidly expanding com-

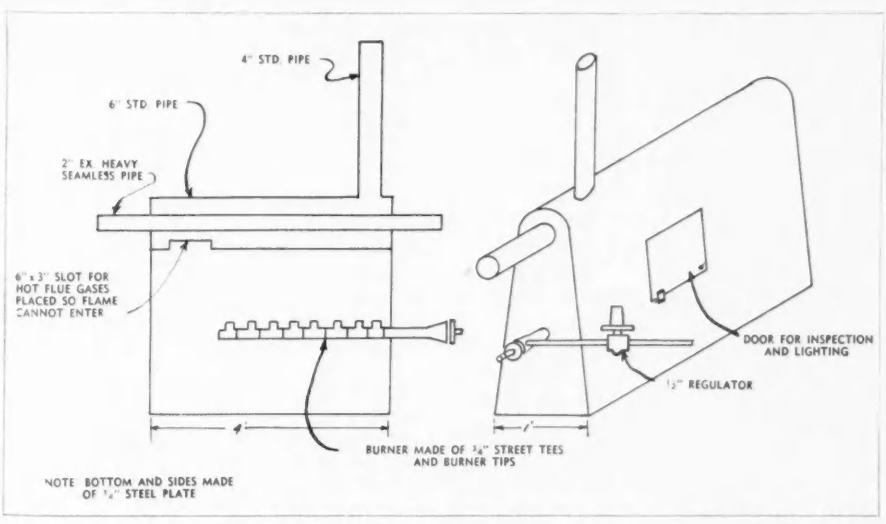

4" STD. PIPE
6" STD. PIPE
2" EX. HEAVY SEAMLESS PIPE
6" x 3" SLOT FOR HOT FLUE GASES PLACED SO FLAME CANNOT ENTER
DOOR FOR INSPECTION AND LIGHTING
½" REGULATOR
BURNER MADE OF ¾" STREET TEES AND BURNER TIPS
NOTE BOTTOM AND SIDES MADE OF ¼" STEEL PLATE

FIGURE 1. Typical direct-fired heater built in the field and designed to give approximately a 30° F. temperature increase to gas flows of 100 to 200 mcf per day.

pressed gases. The exact amount of cooling can be determined thermodynamically and will vary depending upon the case. However, for general use it can be said that a gas will cool 1° F. for each atmosphere (15 pounds) reduction in pressure. As the gas temperature drops, the amount of water vapor required for saturation decreases. Conversely, as the pressure decreases, the amount of water required for saturation increases. The question now to be answered is whether at our new temperature and pressure we are in danger of forming hydrates, or near enough to have localized conditions at a partially opened valve or other restriction to form hydrates. Again we are faced with a problem that a handy chart or table is needed to solve.

Assuming that we know enough about the hydrate forming characteristics of our gas, it is possible to determine the temperature of gas necessary to prevent hydrates. Knowing this temperature and the temperature to which the gas would go upon expansion, it is possible to determine the quantity of heat necessary to add to the gas. This is obtained by multiplying the temperature difference by the specific heat of the gas and the quantity of gas being heated. A common figure used for specific heat of natural gas is 24 Btu/°F/Mcf.

Four kinds of heaters are used to heat gas. First are the electrical strip heaters. Cost is generally prohibitive if any quantity of heat is needed, although they are occasionally used in regulators to counteract localized throttling conditions at valve seats. Second, and perhaps most common, are direct-fired heaters. These use hot gases of combustion around the gas line, or heat exchanger tubes, making sure that flames do not impinge directly upon the tubes.

The third type uses hot water and the fourth uses steam as a source of heat. The heat exchanger for steam can be smaller and a water pump eliminated, but the added investment in condensate return system counterbalances that. Both of these systems generally require a greater investment than a direct-fired heater.

In the case of heat transfer as with direct-fired, hot water or steam heaters, the general heat transfer equation applies, i.e. $Q = UA\Delta T$ where

Q = amount of heat transferred BTU/HR

U = rate of heat transfer Btu/HR/°F/Sq. ft.

A = heat transfer area sq. ft.

ΔT = difference in temperature in °F. between hot and cold side of heat exchanger.

The determination of Q, heat to be transferred, has been previously discussed. The rate of heat transfer, U, is a variable depending largely upon the velocity of the gases and liquids involved. Higher velocities and the resulting turbulence increase the heat transfer rates. These values can be rather accurately predicted if one knows the exact conditions that will exist in the heat exchanger. However, examination indicates that for hot water type exchangers a value of 50-75 Btu/hr/°F/sq. ft. is typical and 5-10 Btu/hr/°F/sq. ft. is typical for a direct-fired heater.

ΔT, the temperature difference between hot and cold side, can be used as a straight average without appreciable error in most instances, although there are other and more accurate means of determining it. The heat transfer area, A, is what we want to determine. This outlines very briefly the procedure of sizing a heater to meet a given requirement.

Our company has used direct-fired heaters in almost all applications. Most of these heaters were built in the field, not designed. However, they have worked quite satisfactorily and have performed their assigned tasks. A typical heater at a field meter station with a two-inch meter run has a burner made up of eight ¾-inch standard street tees and a like number of ¾-inch blast tips, burning gas at 10 pounds pressure. The two-inch pipe at the heater is replaced with extra heavy seamless pipe because of the high temperature it is subjected to. A six-inch pipe three feet long is placed concentrically about the two-inch pipe with a stack at the top on one end and a slot at the bottom on the other end. The burner is placed so that no flames go through the slot on the bottom, but against the solid portion of the six-inch pipe. Then the hot gases go through the slot, into the annular space between the two- and six-inch pipe and finally out the stack. This heater will give approximately a 30° F. temperature increase to gas flows of 100 to 200 Mcf per day (Figure 1).

On the basis of hydrate formation data, and application of heat transfer principles it is possible to predict fairly well the type and size of heater needed for a job, however, for accurate determination of your needs nothing will work as well as actual experiments under operating conditions.

About the Author

H. R. WORTMAN is a native of Grand Rapids, Mich., and a graduate of the University of Michigan with a B.S.E. degree (chemical engineering). He joined Consumers Power Company in 1947 after serving in the Army, and is now engineering assistant to the general gas distribution superintendent.

Pulsation Eliminators

CONTINUED FROM PAGE 265

made by first varying the quantity going through the meter run by bleeding air off after it had gone through the eliminator and then by bleeding the air ahead of the eliminator.

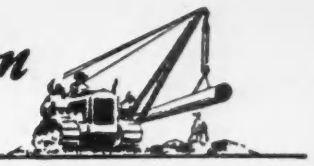
Previous tests were made with this same setup except that the differentials were measured with water manometers. Very erratic results were found with these. Since the differential meters have been installed, results have been more satisfactory.

It can now be said rather definitely that the eliminator tested takes out the effects of pulsation on the orifice meters when the amount of air going through it is that for which it was designed. The pulsation error is reduced over a rather large range when the quantity flowing through the eliminator is varied.

Tests have been made recently on the effect of pulsation at the Wellington Station of Ohio Fuel Gas Company by the use of a "pulsameter." The results of these tests before eliminators were installed are shown in Figure 1. After the eliminators were installed, the results showed that the effect of pulsations was a small fraction of a percent over the whole operating range of the meters.

In conclusion, it can be said that data are still being gathered about the effect of pulsation and that considerable work is to be done before satisfactory measurements can be guaranteed at all times. The measurements which were made under conditions which are indicated to be allright by the pulsameter seem to be satisfactory. Eliminators can be designed which will eliminate the error, but, so far, the effectiveness of them has not been completely demonstrated by tests. As many tests as possible should be secured, in order to show the effectiveness of these devices. Data should be secured on the meters with low differentials which have not been studied as yet.

PIPE LINE *Construction*



By SYLVIA LILLIE, Staff Writer

Projects Announced and Contracts Awarded

Crude Oil Lines

Emsland-Erdorlleitung GmbH (organized by four German crude-producing companies) plans a 35-mile line from the Emsland fields to the Dortmund-Ems canal, Germany. Oil will be moved by barge to planned Emsland refinery.

Illinois Pipe Line Company plans to start in August a 135-mile, 20-inch line from Wood River to Martinsville, Ill.

Illinois Pipe Line Company also plans to start in August a 74-mile, 22-inch line out of Sanford, Ind.

Phillips Pipe Line Company will build 281 miles of ten-inch line from Borger, Texas, to Yale, Okla. This will bridge the gap between existing lines and will make it possible to move West Texas and Panhandle crude to Phillips refineries at Kansas City and Okmulgee, Okla. Construction is not expected to start for several months.

Natural Gas Lines

Acme Natural Gas Company has asked FPC permission to construct 25 miles of 6-, 8-, and 10-inch to supply three Butler, Penn., industrial consumers. It also asked that Manufacturers Light & Heat Company be directed to establish a connection with existing facilities and furnish gas to Acme.

Central Kentucky Natural Gas Company has applied to FPC for permission to build 32 miles of 20-inch loop from North Means to Nicholas County, Ky.

Delta Power & Gas Company plans a line from Big Point field, St. Tammany Parish, to Plaquemines Parish, Louisiana. This line will connect at Big Point field with proposed Louisiana Natural line from Tepetate field.

East Ohio Gas Company has applied to FPC for permission to build a 24-mile line from TGT's line at Petersburg, Ohio, to East Ohio's Austintown station; and 12 miles in two 8-inch storage inlet and outlet lines in Columbiana, Mahoning, and Portage counties. Project also includes a 940-horsepower station in Columbiana County, and an underground gas storage pool consisting of 13 wells.

Louisiana Natural Gas Company plans a line approximately 145 miles long from Tepetate field, Acadia Parish, to Big Point field, St. Tammany Parish. Line will connect at Big Point field with Delta Power & Gas Company's proposed line from Plaquemines Parish to form largest intrastate gas system in the south.

Panhandle Eastern Pipe Line Company has FPC authority to construct 160 miles of loop line in Illinois, Indiana, and Michigan, and to install 16,000 horsepower in existing stations. New facilities, which will increase system capacity to 800 Mmcf, are largely to handle gas from Trunkline's authorized Louisiana-Illinois line. FPC has also approved for construction in connection with this program 188 miles of previously-authorized line and additional compressor units in existing stations.

Pennsylvania Gas Company has asked FPC permission to construct 8 miles of 4-inch and 12 miles of 8-inch line, and to develop additional underground storage facilities by reworking 32 old wells and drilling 12 new ones. Pennsylvania Gas proposes to build a connection between its system and TGT's line in Erie County, Penn., and to receive up to 10 Mmcf of gas daily from TGT.

Republic Light, Heat, & Power Company has application before FPC for authority to build 6.5 miles of 8-inch loop line in the vicinity of Batavia, New York.

South Georgia Natural Gas Company has asked FPC authority for the construction of 144 miles of transmission line from Southern Natural's proposed extension of its system in Talbot County to Brooks County, Ga., and 104 miles consisting of eight distribution laterals from the main line to various Georgia communities. Service to some of the same communities was recently proposed in an application by Georgia Natural Gas Company.

Tennessee Gas Transmission Company has awarded contract for the construction of a 75-mile, 16-inch line from Kinder to Bayou Sale, La., to Latex Construction Company, Houston. Starting date is indefinite.

Transcontinental Gas Pipe Line Corporation has FPC authorization to expand its capacity from the previously-authorized 340 Mmcf to 505 Mmcf with the addition of 134,560 hp in nine compressor stations and the construction, enlargement, and elimination of certain sales and supply laterals.

Trunkline Gas Supply Company has FPC authorization for the construction of a 740-mile, 26-inch line from Longville, La., to Panhandle Eastern's Tuscola, Ill., compressor station. Project includes approximately 560 miles of laterals and 32,000 hp in main-line stations. Line will carry 250 Mmcf, most of which will go to Panhandle for delivery to markets in the Midwest.

United Natural Gas Company has awarded contract for the building of 60 miles of 12-inch line in the vicinity of Brookville, Penn., to Williams Bros. Corporation, Tulsa. Construction will start as soon as weather permits.

Venezuelan Atlantic Transmission Corporation announced plans for the laying of 220 miles of 12- to 16-inch line starting in Venezuelan Atlantic Refining Company's central producing area and running to Santa Teresa, then west to a junction from which one line will go north to the Caracas-La Guarira area, and one west to Valencia, Venezuela. The cities of Arrecife and Maracay will also be served. Line is scheduled to start in October.

Projects Starting

Crude Oil Lines

Buckeye Pipe Line Company is building a 25-mile, eight-inch line from Toledo, Ohio, to Detroit, Mich. Bills & Troth Construction Company, Tulsa, started May 1.

Pan American Pipe Line Company started in May an 80-mile, ten-inch line from southern Scurry County to Humble Pipe Line Company's system at San Angelo.

Pelican Oil Purchasers, Inc., is at work on 55 miles of six-inch in the vicinity of Sulphur, La. Anderson Bros. Corporation, Houston, started in April.

Portland Pipe Line Corporation will start in June 166 miles of 18-inch line between Portland, Maine, and the Canadian border at North Troy, Vt. Oklahoma Contracting Company, Inc., Dallas, will build 85 miles from Portland to Gorham, N. H.; Associated Pipe Line Contractors, Inc., Houston, will build 81 miles from Gorham to North Troy. An additional 70 miles will be built to Montreal, Quebec, by Montreal Pipe Line Company.

Texas-Empire Pipe Line Company started in May 42 miles of 16-inch loop between Wilmington, Ill., and Gary, Ind. O. R. Burden Construction Corporation, Tulsa, is contractor.

Products Lines

Salt Lake Pipe Line Company started in early May a 63-mile, 8-inch line from Mountain Home to Boise, Idaho. Oklahoma Contracting Corporation, Dallas, contractor.

Natural Gas Lines

Central Hudson Gas & Electric Corporation is building 40 miles of 8- to 20-inch from Home Gas Company's line at Tuxedo, N. Y., to Central's gas

manufacturing plant at Poughkeepsie. Britton Contracting Company, Inc., Washington, Penn., started in April.

Colorado-Wyoming Gas Company started in May a 27-mile, ten-inch loop from Boulder Junction to Mesa station. Vaughn & Taylor Construction Company, Inc., Wichita Falls, contractor.

New York State Natural Gas Corporation will start in June 26 miles of 16-inch from Colvin station, Washington County, to Murrysville, Penn. Williams-Austin Company, Pittsburgh, contractor.

Niagara-Mohawk Power Company is building 25.5 miles of 10- and 14-inch line from Therm City to Fulton, N. Y. Williams-Austin Company will start in early June.

Northern Natural Gas Company is starting work on four of its main line 26-inch loops in June. Midwestern Constructors, Inc., Tulsa, is building loop 6—43 miles between Palmyra, Neb., and Oakland, Iowa, and loop 7—66 miles northeastward from Oakland. R. B. Potashnick, Cape Girardeau, Mo., is building loops 8, 9, and 10—112 miles in Iowa and Minnesota.

Ohio Fuel Gas Company will start in early June a 12-mile, 16-inch line from Berlinville to South Amherst, Ohio. Somerville Construction Company, Ada, Mich., contractor.

Ohio Fuel Gas Company is building a 20-mile, 20-inch line from Mt. Gilead to Galion, Ohio. Somerville Construction Company started in May.

Panhandle Eastern Pipe Line Company is building 73 miles of 26- and 30-inch in six loops in Illinois and Indiana. Anderson Bros. Corporation, Houston, started in May.

Southern California Gas Company started work the end of April on 80 miles of 30-inch loop from Whitewater to Puente, Calif. Capacity of Texas-California line will be raised from 305 Mmcf to 405 Mmcf. Midwestern Constructors, Inc., Tulsa, Johnson Western Gunite Company, San Pedro, Calif., and L. E. Dixon Company, San Gabriel, Calif., are the contractors.

Tennessee Gas Transmission is building 40 miles of 16-inch line from Beaver Falls, Penn., to Pittsburgh. Britton Construction Company, Weatherford, Texas, started in early May. Britton Construction Company is also building five river crossings for TGT: Beaver Falls, Muskingum River at Zanesville, Hocking River, Mahoning River, and French Creek River.

Transcontinental Gas Pipe Line Corporation is constructing the following major river crossings: Raritan River in Middlesex County, N. J.; Rahway River in Middlesex and Union counties, N. J.; Susquehanna River in York and Lancaster counties, Penn.; James River in Buckingham and Fluvanna counties, Va.; Delaware River in Bucks County, Penn., and Mercer County, N. J.; Potomac River in Montgomery County, Md., and Fairfax County, Va. Anderson Bros. Corporation, Houston, started preliminary work in early May.

United Gas Pipe Line Company resumed work in May on a 106-mile, 20-inch loop on its Carthage-Sterlington line from De Soto Parish to Monroe, La. This loop will increase the capacity of the line to 432 Mmcf, and will increase delivery to Mississippi River Fuel Corporation to 195 Mmcf. O. C. Whitaker Company, Fort Worth, contractor.

United Gas Pipe Line Company recently started 25 miles of 16-inch loops between Luling and Cut Off, La. J. Ray McDermott & Company, Inc., Harvey, La., contractor.

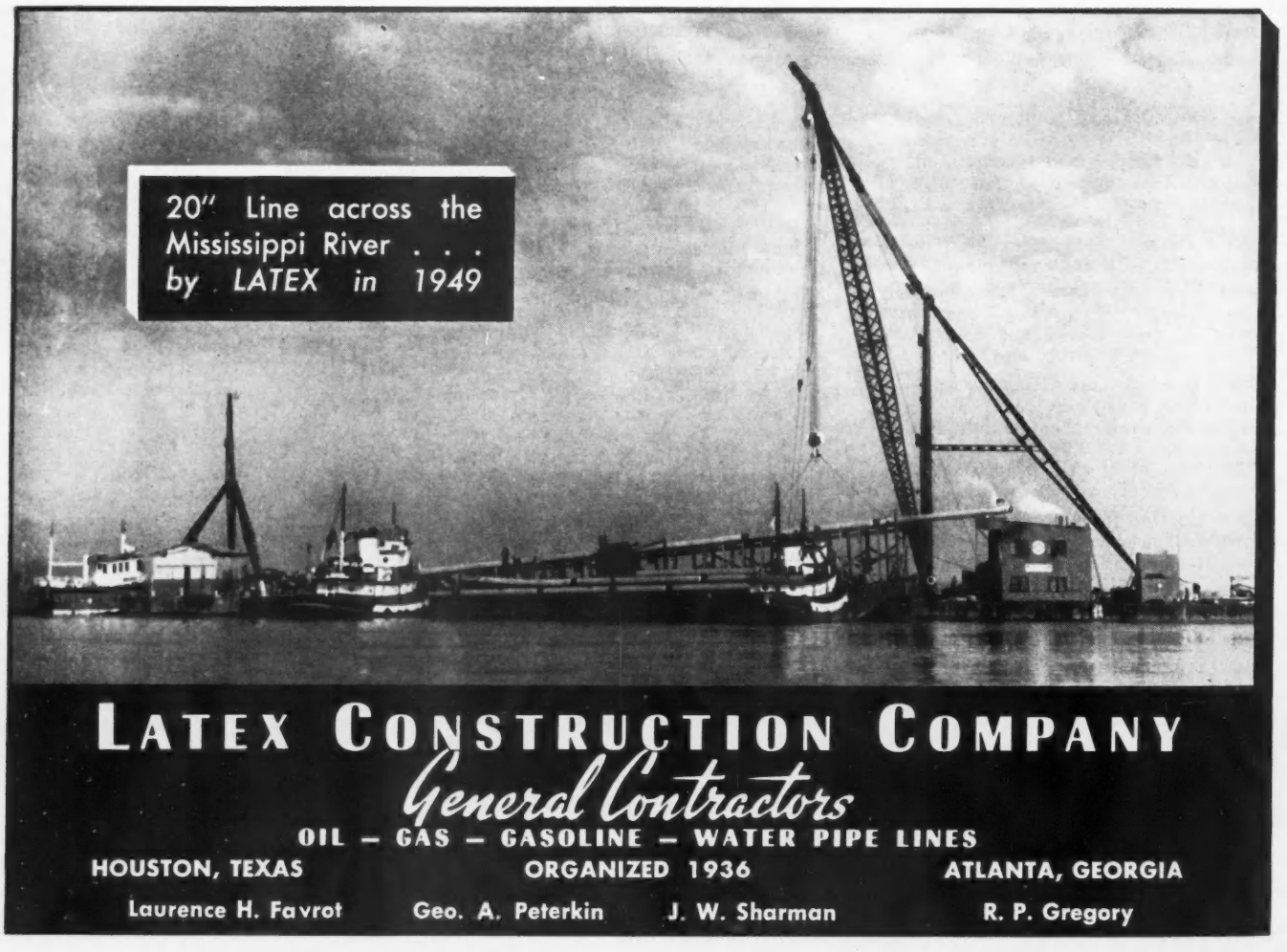
Projects Completed

Natural Gas Lines

Jersey Central Power & Light Company will finish early in June 40 miles of ten-inch line from Bound Brook to Long Branch, N. J. Construction Service Company, Bound Brook, and Proctor, Inc., Long Branch, contractors.

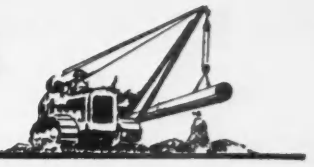
Michigan Gas & Electric Company completed in April a ten-mile, six-inch line from Michigan-Wisconsin's 22-inch line to Holland, Mich. Somerville Construction Company, Ada, Mich., contractor.

United Fuel Gas Company will complete in early June 12 miles of 10- and 20-inch from TGT's transmission line to storage fields near Nitro and Clendenin, W. Va. Williams-Austin Company, Pittsburgh, contractor.



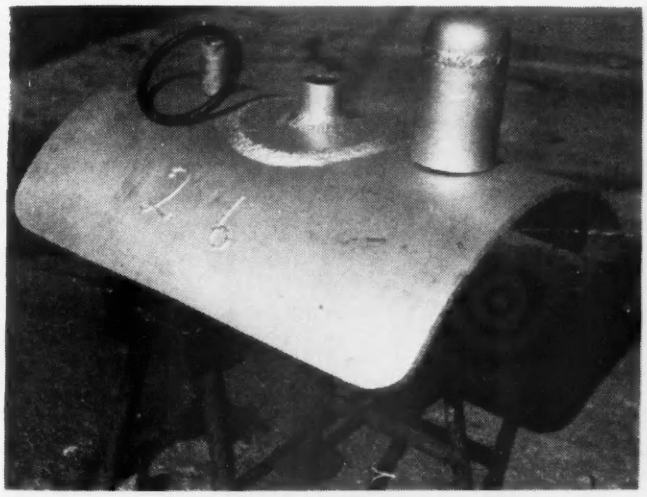
How to do it!

PIPE LINE HINTS



$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas

HOW TO—Make Vented Welding Repair Patch



Used to repair pit-hole leaks on large natural gas transmission lines, and in some instances, to repair cracked welds and broken taps, is this shop-made vented welding repair patch. The patch is made of seamless pipe of the same diameter as the line to be repaired. A 30-by 30-inch pattern is laid out on the patch material, and a small vent hole is drilled at one corner of the pattern about three or four inches from the edge of the patch.

A circular hole is then cut from the middle of the patch to form a shoulder for holding a transite pipe coupling rubber used as a gasket to seal the gas off safely while the patch is welded to the line. The hole for the transite gasket is determined by the size of rubber used to seal off the pitted area on the pipe to be repaired.

A circular piece of pipe is cut from the same diameter pipe used for the patch, and is two inches larger than the hole cut in the center of the patch. It is welded to the 30-by 30-inch patch and completes the seat for the coupling rubber. A 1½-inch extra-heavy steel coupling is welded in the center of the circular cover piece, and makes the vent connection for the escaping gas. Piping is then connected to the coupling to convey the escaping gases away from the patch. In patching a bell-hole, piping should be at least above the ground surface.

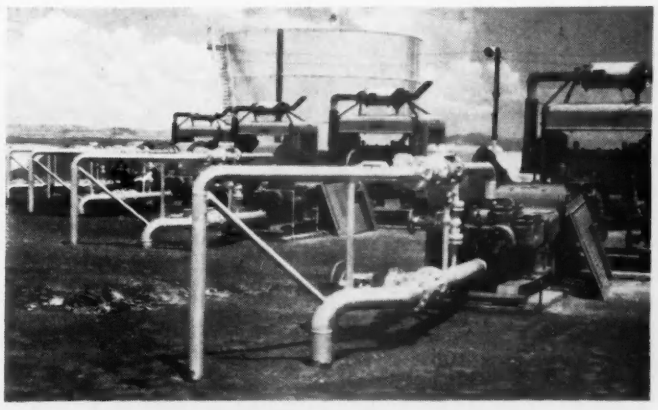
After welding the 1½-inch coupling, a tap should be inserted in the coupling to free foreign matter from threads, allowing easy installation of the 1½-inch bull plug. All possible welding should be done before the patch is cut to eliminate drawing of the steel.

In repairing the line, the patch is held tightly to the line by hydraulic jacks and two chains wrapped around the line. As the patch is drawn down on the line, the rubber gasket is pressed against the line to form a tight seal. Escaping gases are directed through the 1½-inch coupling and through the vent line.

When the patch has been welded to the line, the small vent hole is welded closed and the chains and vent piping removed. A 1½-inch seamless steel bull plug slotted in several places is screwed into the coupling and welded. The slotted end permits the gas to escape while the threads are engaged. In the event of excessive pressures, a swedge nipple and gate valve can be used.

A 4½-inch bull plug eight inches long is then welded over the 1½-inch coupling and bull plug. A half-inch tapped hole in the welded cap is closed with a steel plug and welded. The repaired line is then ready for coating and wrapping.

HOW TO—Align Pump Connections



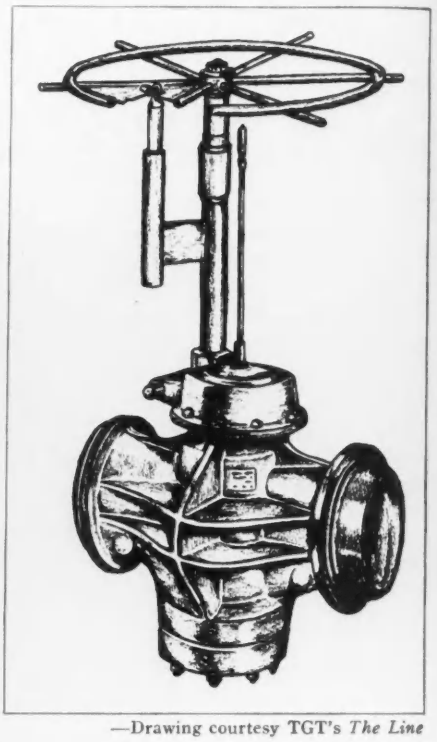
Mounting both suction and discharge leads from each of a battery of four pumps in an outdoor pumping station utilizes the horizontal portion of each line as a shock-absorber which suppresses vibration which might be transmitted to the underground manifold were direct connections used. The angle also serves to take up minor variations in length due to unequal elongation of the two leads through temperature changes.

When servicing or replacing either suction or discharge gate, the angle mounting of the welded piping allows it to be twisted enough to afford gasket clearance without need for further disturbing any of the pump connections.

One vertical brace just ahead of the elbow in the suction line and one at 45 degrees at the center of this unit, serve to tie together the welded portions of the two lines, and to form a support which maintains both lines in place even though both valves be disconnected.

HOW TO—Devise Lock for Main Line Block Valve

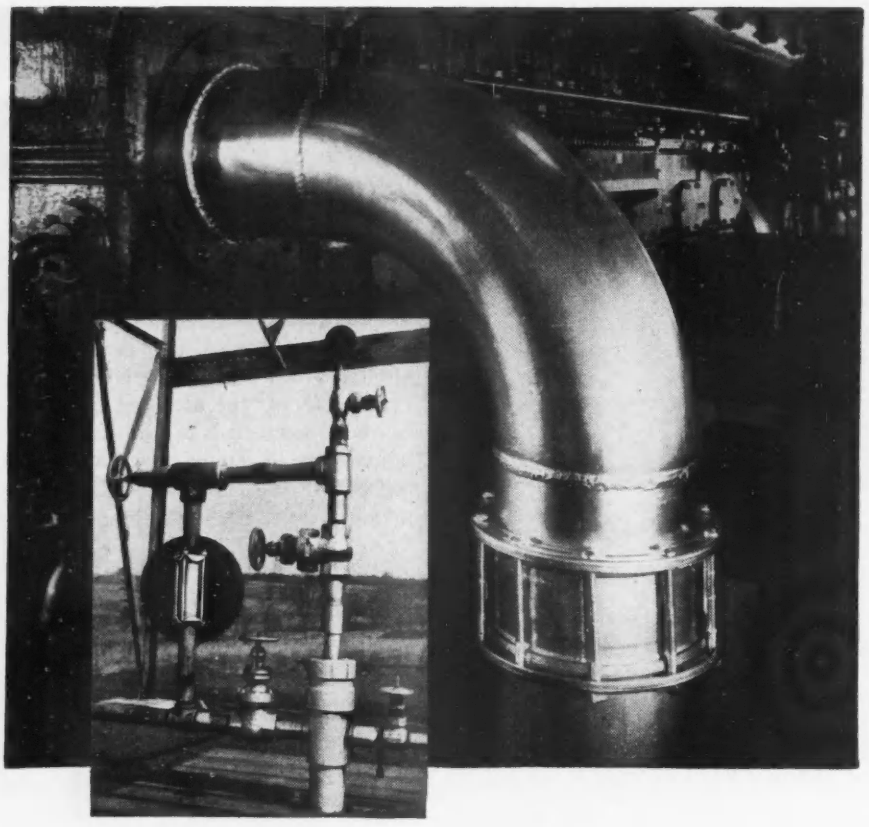
On large cross-country natural gas transmission lines, the right-of-way, in most cases, is not fenced but left open for the land owner to traverse as he chooses. Pipe line safety practices make it necessary to place large block valves at regular intervals on the main gas line. These valves serve to block the flow of gas at any point along the line both above and below a line break or leak large enough to warrant shutting in the line. They may be located from ten to 20 miles apart, and many of them are located in out-of-way places where they are unguarded. For this reason, these main line block valves must be locked so the unauthorized persons cannot tamper with them.



—Drawing courtesy TGT's *The Line*

Illustrated is an effective, yet simple method of locking these valves. The complete valve body extends below the surface of the ground with only the wheel and valve lubricating fitting rising above ground. A web of sheet steel was welded between two adjacent spokes of the wheel as shown, and a small slot cut in the web to accommodate an eye of a steel cylindrical weight. The weight fitted into a nipple about ten or twelve inches long. The nipple was open at top and bottom and was welded to the valve stem extension housing by a rectangular piece of plate steel.

When the valve was fully opened, the slot in the web appeared directly over the weighted cylinder so that the eye could be inserted through the slot. A lock placed in the eye completed the valve locking device. The cylindrical weight was long enough so that the valve could not be turned unless it was disconnected from the wheel by unlocking the lock. The use of this valve locking device has proven quite successful on one large gas transmission line, and it provides positive locking.



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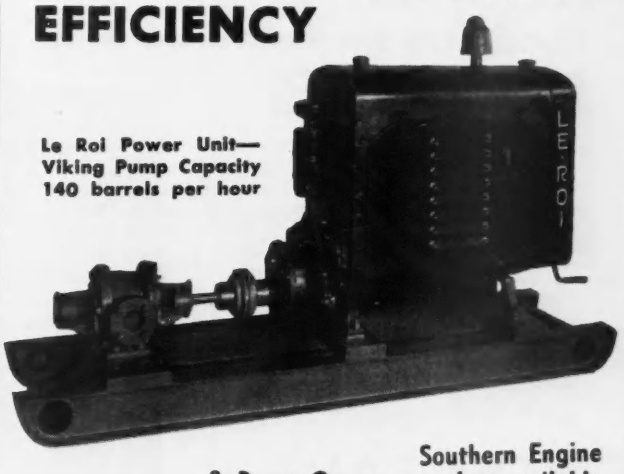

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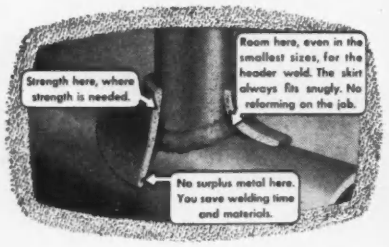
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HOW TO—Improve Pipe Line Truck

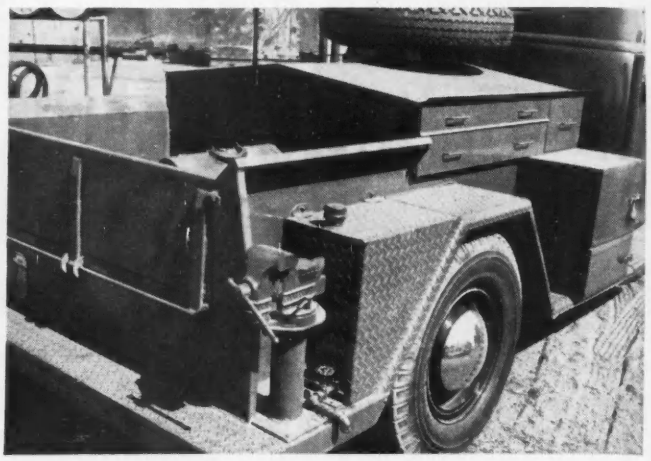

Photo Courtesy The Lincoln Electric Company

Large drawers for tool storage, a handy vise mount, and a tank for solvents are part of the equipment on this cleverly designed truck. A locking device near the spare tire, on top of the drawers, locks all units by a single turn of the handle, thus preventing loss of valuable equipment. An extra drawer opens into the rear of the truck.

The vise mount is so designed that it can be swung in an arc allowing it to accommodate almost any type of job. The solvent tank, neatly mounted on the rear fender, is made of walkway plate welded in the shape shown. A handy valve and outlet pipe is screwed into the bottom of the tank and extends slightly over the rear bumper.

Additional storage space is acquired by mounting small steel boxes on the running board behind the cab on either side of the truck. The combination step and bumper at the rear allows easy access to the equipment stored in the truck. A fire extinguisher is conveniently mounted on the opposite side at the rear and can barely be seen in the upper left hand corner of the illustration. The tail gate was strengthened by adding one more hinge in addition to the two end ones. A half-inch rod bar extends the full length of the tail gate to secure all hinges.

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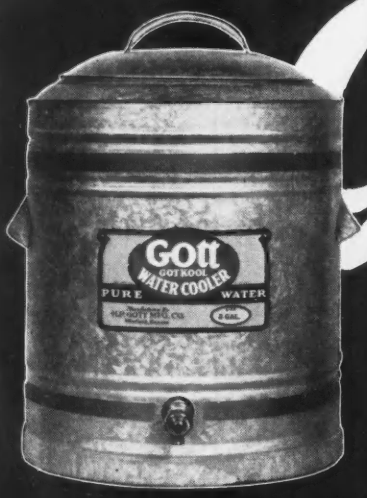

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PIPE LINE HINTS

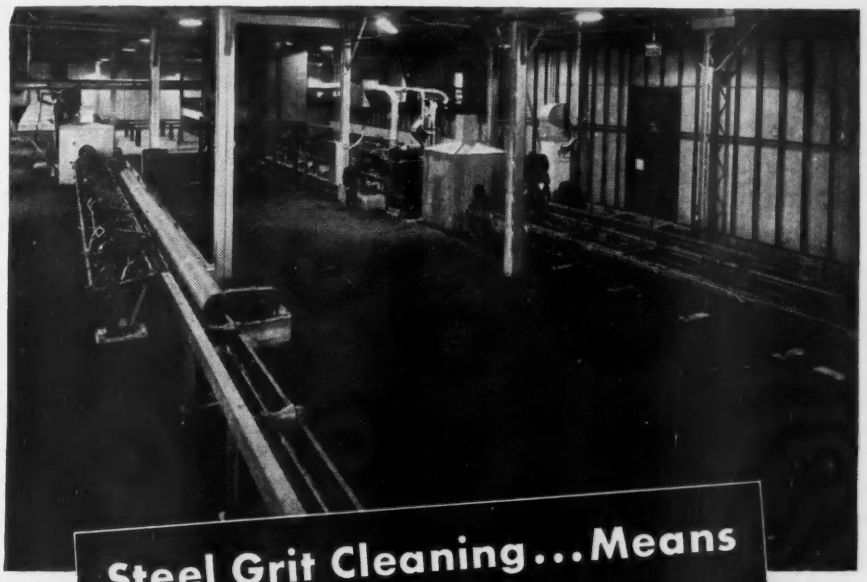
HOW TO—
Build Detachable Field Anvil Base

An anvil is an invaluable aid to a pipe fitter or welder when working in a central shop or yard. For the average field job, however, it generally is not feasible to carry one for the reason that it is difficult to mount solidly and so mounted, becomes a very heavy and awkward device to handle when job sites are shifted. One crew, working on jobs that keep them spotted at a location for moderate lengths of time, found it desirable to rig up a semi-permanent type of mounting for their anvil, and one that could be moved easily.

The mount consists of a two-foot length of 15-inch heavy pipe turned up

on end and welded shut at the top. A two-inch ring flange on the bottom serves to lend additional stability to the stand.

The anvil, placed on top of this support, is held firmly and prevented from lateral movement by two narrow half-circle pieces of steel, the latter carefully formed so as to match perfectly the curvature of the indentations on each side of the anvil's base. Welded to the top of the stand in the manner shown, these curved pieces of steel prevent lateral shifting, but do not prevent lifting the anvil straight up and off the support. Thus, for all normal work that might be encountered in such light pipe work, the anvil and base serve very well, it being relatively easy to load them separately when work shifts to a new location. Round bar handles on either side of the stand facilitate the handling and loading of the stand itself and aid in positioning it on a level piece of ground when it is set up for use.



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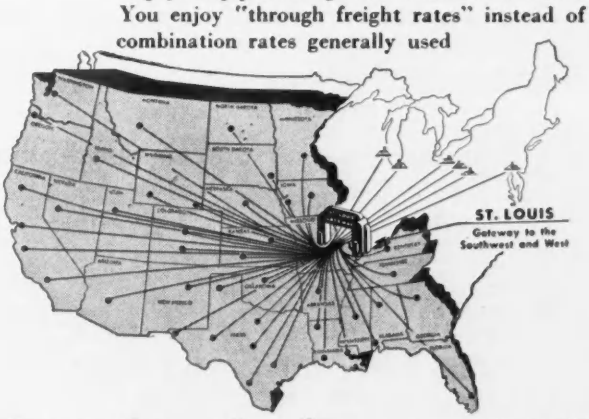

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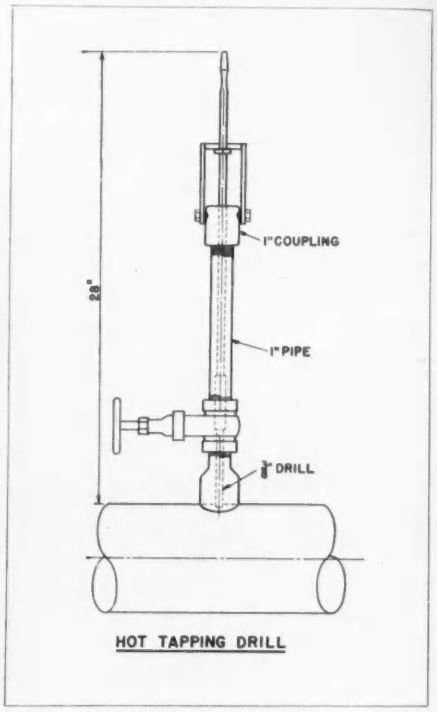
How to—Make Efficient Line Tapping Device

Tapping gas lines under pressure with a drill as small as three-eighths-inch is possible with this home-made line tapping device. It is practical and handy for installation of farm tap settings or other similar taps requiring a small hole in the line. The device is smaller than other like machines, and it can be installed and removed in five minutes.

It consists of a two-inch swedge nipple, one inch gate valve, 12-inch length of one-inch pipe, a one-inch coupling, a hinged bracket drill and drill extension. Over-all length of the device is just 28 inches when the drill is touching the pipe to be tapped.



HOT TAPPING DRILL

The tapping device shown in the drawing is made up of standard pipe fittings. A U-bracket is hinged to the one-inch coupling and drilled with a hole slightly larger than the drill stem extension. The drill is attached to the extension by a collar, and the upper part of the extension is threaded in order to apply pressure to the drill.

In use, the swedge nipple is first welded to the line at the point where a tap is desired. The drill is inserted and the hole made. While the gas is blowing through the device, the drill is withdrawn and the gate valve closed to complete the tap. The short length of one-inch pipe is removed and other connections made.

Tapping lines with a smaller hole where small quantities of gas are required is usually desirable. In the event of a break in the small lateral line, the small tap hole in the main line will serve as an orifice to restrict the flow of gas until the lateral is repaired.

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Modern camp erected near Gumburo 1 houses Sinclair's American employes and Ethiopian nationals. An airstrip was built near the camp.

Ethiopia to Get Second Exploratory Test

By HENRY OZANNE
Eastern District Editor

SINCLAIR Petroleum Company is pushing an active exploration program in Ethiopia preparatory to determining the site of its second deep test in the Ogaden desert. The first well, Gumburo 1, in southeastern Ethiopia, was abandoned April 7, 1950, after reaching a depth of more than 10,000 feet. Sinclair emphasizes that it is projecting a long-time program in Ethiopia and will continue shipping in supplies and equipment. It now has ample equipment on hand at Dire Dawa to drill the second well.

Sinclair is carrying on exploration this summer in the Ogaden with one seismic and one geological party and a magnetometer crew. Drilling personnel has been furloughed home to the U. S., including Walter J. Wells, general superintendent of Sinclair operations in Ethiopia. The present work is in charge of the company's chief geologist, W. O. Clift.

The company spudded in its first test May 10, 1949, and spent 11 months in slow drilling in order to make careful coring and testing of all formations encountered. The well was drilled in an untested part of Africa, 250 miles by air and 475 miles by road southeast of Dire Dawa. The modern camp which was erected housed 60 Americans and hundreds of Ethiopian nationals, making it as populous as many tribes of the region and with more permanent installations than the Ethiopian towns themselves have. Moving equipment to the well site proved a formidable task. The heavier pieces were sent by boat to Djibouti, French Somaliland, and from there were hauled by railroad to Dire Dawa. There the equipment was transferred to truck and hauled to the location.

In connection with the camp, one of the most modern ever constructed for oil work, a 5000-foot air strip was cleared for plane service.

In addition to technical difficulties, political disturbances hampered work for two years and operations were for a time suspended during arbitration of the Ethiopian boundary dispute and evacuation of the British from the country.

Sinclair began its operations in Ethiopia on the basis of surface studies by Italian engineers before the war. The record of this study, in the form of rough field notes, was distributed piecemeal throughout a dozen libraries in Italy during the war to prevent destruction. Later the Italian geologist who headed the entire work, Carlo Migliorini, joined Sinclair and reassembled all the data.

Sinclair Petroleum Company is a wholly-owned operating subsidiary of the Sinclair Oil Corporation. Seven years ago it obtained an exploration concession for all Ethiopia. Extensive geological studies were conducted for three years before the first well was spudded in.

This is the most common means of transportation in Ethiopia despite modern methods used by Sinclair Petroleum Company in its exploratory operations in that northeast African country.

A Flying Kelly in Ecuador

By

FREDERIK J. STRUBEN, JR.

FLYING a kelly as a part of the drilling equipment into a jungle wildcat camp proved to be an interesting and complicated procedure, which was successfully solved by Shell Oil Company of Ecuador, Ltd., and Pan-American Grace Airways, Inc. (Panagra). Due to the location of the drilling site east of the Andes Mountains in the upper Amazon region in Ecuador, air transportation was the only possible way to bring the rig to the location of the first wildcat ever drilled east of the Andes in Ecuador.

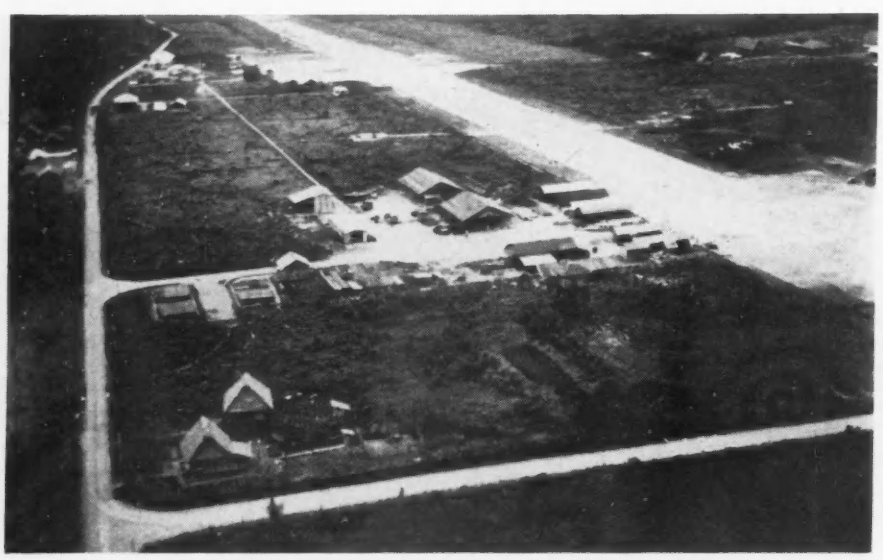
Shell Mera was the base camp in the mountains from which all other camps were supplied and where the company planes were stationed. The base camp was well established by the time activities were centered on building Arajuno, the camp adjacent to the location of the proposed well. The first essential equipment for building an airstrip was laboriously carried over jungle trails by native carriers. The greatest problem was a tractor, brought in piece by piece by a native safari, to assist in building the airstrip. When the airstrip reached a stage enabling planes to land and take off, the travel time from Shell Mera to Arajuno was reduced from three days to 22 minutes.

The only planes available for the operations in the early stages were one very old tri-motored Ford and a Grumman amphibian, the latter also being used to supply the various seismograph parties working in the jungle. Material flown to Arajuno included an ice plant, laundry facilities, an electric plant, many building materials, and even trucks and tractors. The tractors could be partially dismantled for shipment but the trucks posed another problem. The loading doors of the planes were too small to admit the trucks, so the truck cabs were cut in two with a blow torch and welded together again at point of arrival.

It was necessary to build a road from the camps through virgin jungle to the location of the proposed well, and this road was built largely by an overworked tractor brought in at the beginning of operations. The distance involved was about four miles as the Arajuno airstrip had to be built at the nearest level plateau to the well site.

A cargo plane with a special large loading door was chartered from Panagra. The plane shuttled between Shell Mera and Ararjuno, loading and unloading, from dawn till dark, unless bad weather made flights impossible.

For the loading and unloading of exceptionally heavy pieces of drilling equipment such as the drawworks, rotary table, main engines, pumps and traveling block, it was necessary to build a special loading and unloading pit for the plane at each field. This consisted of one pit for each main landing wheel of the plane and a small ramp for the tail wheel. When the plane was backed into the pit the floor of the plane was level with the ground and at the proper height for the bed of the truck discharg-



Shell-Mera, the base camp for operations in the jungles of Ecuador.

THE AUTHOR PRESENTS an interesting sidelight of one of the many problems facing oil operators in Ecuador and other countries with similar transportation problems. Movement of heavy equipment through practically impenetrable jungle will concern more operators as exploration work expands in these areas.

ing or receiving the equipment. This relieved undue strain on the ship during the loading and unloading operations of the heavy pieces, which could be carefully rolled in the desired position in the plane.

One of the most interesting problems developed in transporting the 4½-inch kelly, by no means the heaviest but by far the most difficult piece of equipment to handle. First a template was made to the exact length of the kelly and it proved that the kelly was too long to be placed in the plane by ordinary means. Due to previous experience with a kelly which had been cut, it was decided that it had to be shipped intact.

This phase of transport was satisfactorily solved in a few hours. One of the cockpit windows was removed and the kelly eased into the plane through the big door, the pin end protruding through the window opening. The kelly was then eased backward into the body of the plane in dead center along its length, the collar end resting in the lavatory compartment. The forward section of the kelly was lying between the hydraulic controls for the landing gear. All this loading was done by native labor and great care was taken not to touch or jar any of the instruments in the cockpit. After the kelly was placed in the ship it was blocked up to a level position and sacks of potatoes were added to trim the ship. The windshield had to be replaced for the flight.

After arrival at Arajuno, the above procedure was reversed without any damage to plane or kelly. Shortly thereafter drilling operations commenced.

TOP RIGHT: Native crew pushes the kelly through the plane door.

☆

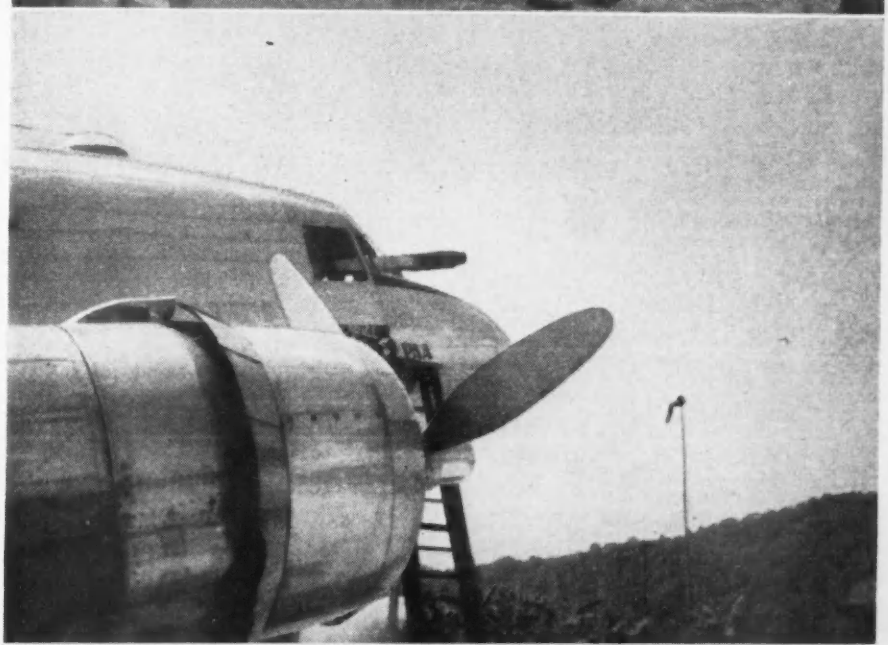
CENTER: Kelly pin projects through the cockpit windshield so the collar end will clear the loading door opening.

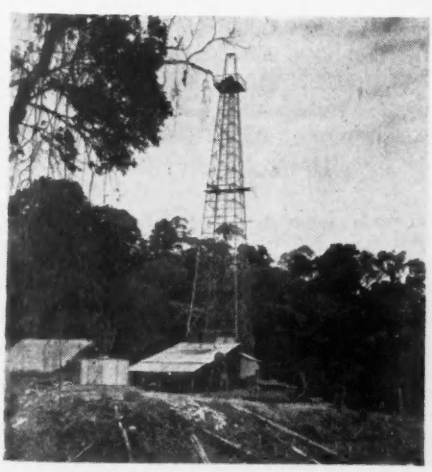
☆

LOWER RIGHT: Kelly ready for flight. View is toward the cockpit showing the location of the pin, uncomfortably near the controls.

☆

LOWER LEFT: Well location is typical of the terrain in most of Ecuador.





ASIDE FROM the extremely cold winters in Canada the problem of transportation is one of the greatest obstacles to petroleum exploration. The author presents an interesting discussion of how one company solved the problem of getting around in the bush country.

Seismic Surveying In Canada Aided by Mobile Equipment

By W. J. TELLINGTON

Geophysicist, Bear Oil Company, Ltd.
Edmonton, Alberta, Canada

IN ORDER to carry on seismic surveying operations in Western Canada the equipment used must be extremely light in weight or unusually mobile. Surveying tools which cannot be carried by members of the crews are mounted on tractors and trailers specially designed to travel through some of the toughest terrain in North America.

Until much of this special equipment was designed surveying instruments were packed through the bush on men's backs. Since manpower is at a premium in Alberta, the cost of moving equipment by this means was prohibitive and the size of the equipment was limited to the power available.

Western Canada is a vast, rugged territory covered almost entirely with a mantle of glacial debris which when wet seems to be bottomless. To design mobile units capable of dealing with the natural obstacles in the country, substantial initial capital investments and a great deal of technological experimentation were required.

The first step taken to lick the transportation problem was to profit by the experience of the farmer and lumberman who were in the country long before oil exploration was ever contemplated. By observing the methods these men used to move about through the bush with equipment too heavy to carry, it was possible to extend their practices to the point where they were adaptable to seismic equipment. The accompanying photographs show that much of the equipment being used by our surveying crews is a modification of commonplace farm implements.

In the bush and muskeg country of Western Canada one encounters mud, slush, and extremely soft ground more than six months of the year. Because of this, three factors are very important in

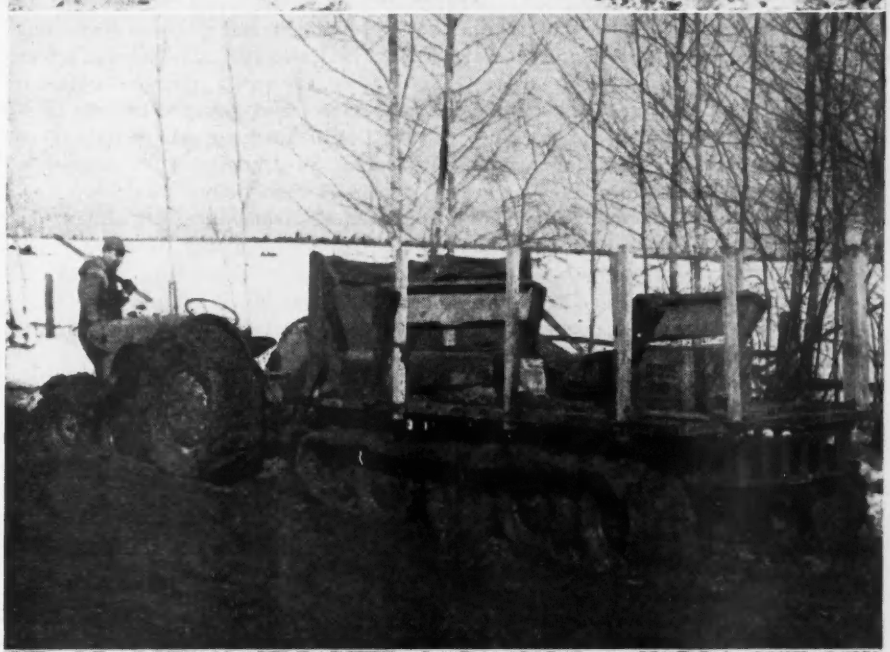
Lightweight aluminum sleeping trailer being moved into the base camp while the ground is still frozen. This is one of the few main roads in the bush country of Alberta from which the trails to advance camps are cut. The trailer was built by Bear Oil Company for this work.

mobile equipment: flotation, width, and maneuverability. Wheels or tracks must have a flotation of less than two pounds per square inch on the ground. Width of the mobile equipment must be held at a minimum because road building through the bush of Western Canada is one of the most difficult and expensive such operations in the world. As it is not possible to cut down the length of these roads, it is necessary to reduce the alternative dimension—width. The necessity of equipment maneuverability is self-evident.

The initial phase of road building begins with a four-man crew cutting out trees and brush a width of six feet along a blazed trail leading to the desired location. The stumps of the brush cut down are left no more than six inches above the ground and the root matting left in the ground is important as a road foundation over which is laid all the branches and debris not large enough to create an obstacle. Without this web of roots and branches it would be impossible to traverse these bush roads in the summer months when the frost is out of the ground. This four-man road clearing crew covers a distance of 1¼ miles a day, even in deep snow, at a cost of 50 dollars per mile which is considered quite reasonable.

The location of these roads and operations camps are usually determined through the use of aerial maps furnished at a very minimum cost to operators by the Province of Alberta. Large portions of Alberta were mapped in this manner in the summer of 1949 and the work is expected to continue this summer.

Once the bush roads are built in the area to be surveyed, living quarters and surveying equipment are moved in. A fine point of distribution is required here as a base camp has to be established to support the advance drilling camps. As only the lightest equipment can be taken over the roads in the summer the advance crews live in tents, but every effort is made to insure the maximum comforts of the men under the circumstances.



(Top). **The portable drill is moved on a specially constructed sled in the winter months.**

☆

(Center). **A supply trailer built by Bear Oil Company showing the type of tracks required for the muddy terrain when the frost goes out of the ground. The tractor has wide tracks on the four rear wheels which are not visible because of the mud.**

☆

(Bottom). **Another type portable drill used in the bush is mounted on a specially designed track trailer which can travel in snow or mud.**

Review of Petroleum Producing Industry in JAPAN During 1949

OPERATIONS in 1949 resulted in the first concrete gains after three years of effort by the producing industry to regain its former status, against very difficult economic and social circumstances. After thorough study of the situation during 1946, Natural Resources Section expressed the opinion that Japan's petroleum resources are by no means exhausted and that the revival of the industry is dependent on the finding of new reserves awaiting discovery. This opinion has been fully justified and brought to the stage of tangible accomplishment. This year marks the first significant uptrend in production since 1934, a greatly improved reserve situation, increased efficiency in exploration methods and drilling techniques, and a strong revival of morale in the industry. A solid foundation has been laid for surpassing the prewar peak production of 1937-38 within the next two or three years. Although Japan's producing industry supplies only about 10 percent of the country's requirements of petroleum products, the expected future uptrend in production will make a significant contribution toward balancing Japan's economy by reducing future foreign exchange expenditures on one of its major essential items of imports.

Japan's 1949 crude production averaged 3748 barrels daily, an increase of 22 percent over the 3063 barrels daily in 1948. Production of 1,368,050 barrels of crude, including 15,240 barrels of natural gasoline, during 1949 was the highest annual production since 1945 and marks the first significant uptrend since the decline which began in 1938; of this total, 94.5 percent was produced by Imperial Oil Company.

The immediate factor contributing to the recovery of the industry was the final settlement in January, 1949, of the labor trouble which seriously retarded both production and drilling operations during 1947 and 1948. The situation was settled by mutual agreement between management and unions on the discharge, with adequate compensation, of 30 percent of Imperial Oil's employes. After the force reduction was completed, increased efficiency in well maintenance and drilling operations resulted in a rapid rise in average daily production from 2630 barrels in January to 4270 barrels daily during the last three months of 1949.

Thirty four producers were completed in 1949 out of a total of 63 wells drilled for a total footage of 149,066 feet. Total initial daily production from these producers was 1538 barrels and, for an average of 165 days' production during 1949, these wells produced 144,710 barrels, equal to more than 10 percent of the year's total production.

An analysis of the results of drilling shows that the percentage success rate for exploration drilling (outposts, 59 percent; new pool tests, 33; new field wildcats, 0) compares favorably with that, for example, of California (53, 30, 5 percent respectively); these high success rates are directly attributable to the careful consideration and screening of exploration drilling projects by the Petroleum Resources Development Promotion Council (formerly the Petroleum Exploration Advancement Committee).

SUBSTANTIAL GAINS have been made in Japan during the year to return the country's oil industry operations to levels equal to or greater than the peak prewar years of 1937 and 1938. The review presented here is part of a paper prepared by the Natural Resources Section, General Headquarters, Supreme Commander for the Allied Powers in Japan.

Most of the new production was from extension and exploitation of deep reservoirs in Yabase field, Akita Prefecture, and exploitation of the Narahashi field, Yamagata Prefecture, discovered in 1947.

Extensions were proved by test drilling in Hachimori field, Akita Prefecture; Narahashi field, Yamagata Prefecture; and Kaji field and the Betsuyama block of Nishiyama field, Niigata Prefecture; and a new shallow pool was discovered in Kaji field. These minor discoveries contributed about 250,000 barrels of new reserves.

The most significant discovery, however, was that of the deep zone VIII at about 4200 feet in Yabase field, Akita Prefecture, which was proved to extend south at least 12,500 feet from the extreme north end of the field where it was first found to be productive.

A deep test, not yet completed, in the Koya area (central part) of Yabase field, has proved that the five wells already producing from Zone VIII have penetrated less than one-half the full thickness of the new zone. This well also proved a deeper Zone IX at 4600 feet and Zone X at 5500 feet.

Present indications are that Zone VIII is considerably thicker and has a larger productive area than Zone VII. A preliminary estimate of the recoverable reserve of Zone VIII is 6,290,000 barrels. Zones IX and X have been encountered in only one well to date, so that no estimate of reserves is yet possible. The electric log indicates, however, that Zone IX may be more productive than Zone VIII and that Zone X is probably less significant.

Exploration surveys for oil and natural

gas continued at about the same scale of operations as in the previous three years, under the guidance of the Petroleum Resources Development Promotion Council. Some increase was made in surveys for methane gas, but some projects originally assigned to the Geological Survey and to academic institutions were canceled because of the reduced exploration subsidy supplied by the government.

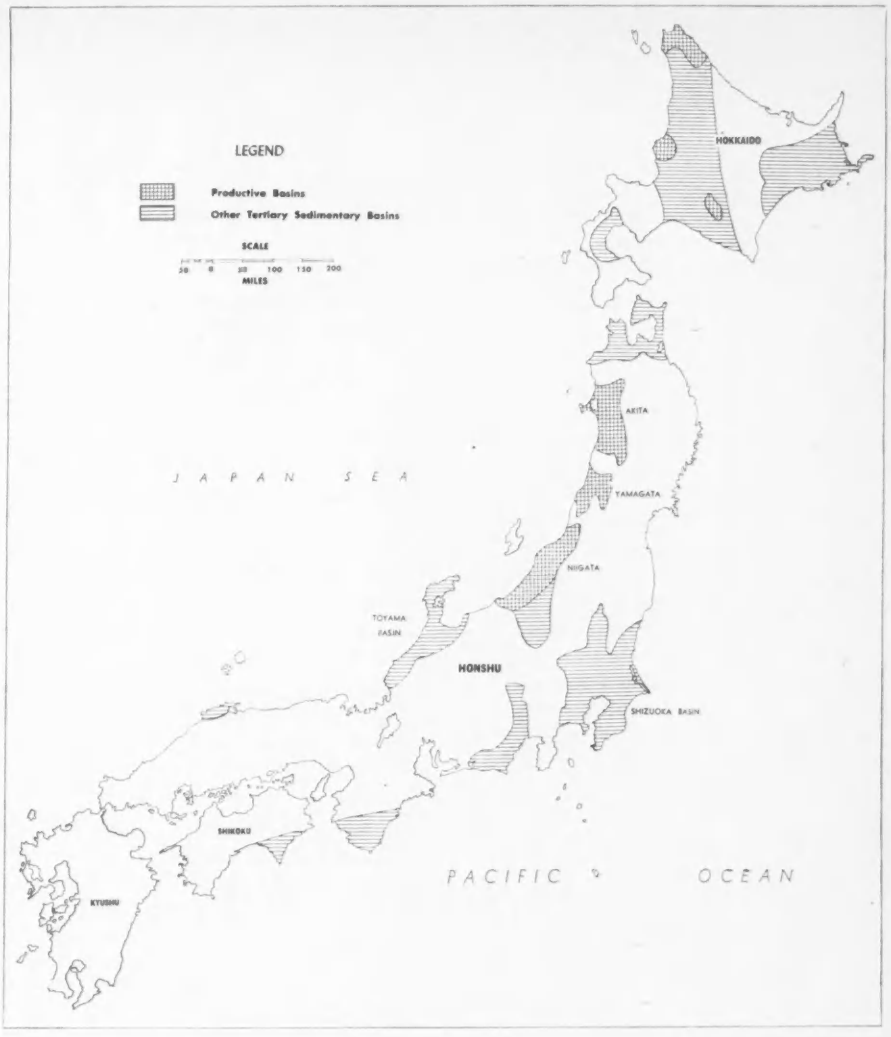
Results of Exploration

Apart from the clarification of the detailed structure of several promising areas by geological and geophysical survey, the most significant results of the short-range exploration survey program were the following: (1) The northern part of a large structure immediately west of and parallel to Japan's largest oil field at Yabase was outlined in detail by seismic reflection and two culminations are indicated on the anticline; a test well location was selected for drilling early in 1950. (2) Shallow drilling through the volcanic detritus covering the area north of Narahashi field, Yamagata Prefecture, revealed the possibility of additional fault trap accumulations similar to those of Ishinazaka and Narahashi fields. A test well location was selected in this area.

Geological surveys clarified details of structure and stratigraphy in Hokkaido. The deep test well on the Kawaguchi structure in northern Hokkaido, which is planned to test the Paleogene and Cretaceous, spudded in July and had penetrated 3500 feet of Miocene sediments by the year's end, after encountering trouble from high pressure water sands. Geophysical exploration was considerably accelerated by the use of two new portable seismic reflection units and two gravity meters which arrived from the U. S. in July. One set of each was acquired by Imperial Oil and the other sets by the Geological Survey. Gravity meters were used for the first time in Japan, all previous gravity work having been done either by pendulum survey or by torsion balance.

Paleontological research made considerable advances in 1949. Imperial Oil's micropaleontological staff was increased and a modern new laboratory was completed in October. The principal achievement of this laboratory was in detailed correlation of wells in Kaji field, where the tracing of very thin lensing oil sands is a major problem.

Imperial's chief paleontologist, Dr. T. Oinomikado, went to the U. S. in November to study modern laboratory techniques. Basic studies completed by academic institutions include a check list of Japanese Tertiary smaller Foraminifera and a check list of Japanese Tertiary Mollusca. A complete illustrated card catalogue of Japanese Tertiary smaller Foraminifera is being prepared for publication.



In connection with the long-range program of the Petroleum Resources Development Promotion Council, a series of 1:200,000 compilation geologic maps of all the producing and potentially petroliferous areas in Japan was completed in manuscript and most of the basic data for a detailed report on evaluation of petroleum prospects in Japan was prepared.

Visiting Experts

During the year, two visiting experts were attached on short-term assignment to the staff of Natural Resources Section. Dr. Lloyd W. Stephenson reviewed the progress of the oil exploration program and appraised the future prospects; an abstract of his report was published in the Bulletin of the American Association of Petroleum Geologists in December, 1949. Godfrey F. Kaufmann, geophysicist of Standard-Vacuum Oil Company, investigated the status of geophysical operations in Japan and contributed much valuable advice to Japanese geophysicists concerned with both oil exploration and general problems in the field of geophysics.

During 1949 a notable increase was effected in the efficiency of drilling and production operations. Drilling times were reduced to a little more than half that of the previous few years by closer attention to mud control and more efficient cementing aided by two new skid-mounted cementing units imported from the U. S. Several directional wells were satisfactorily completed in Yabase field, and gravel-packing was successfully applied for the first time in Japan at Narahashi field. Oil-base drilling muds were used for the first time in Japan to drill into the shallow low-pressure reservoirs in the Omonogawa area of Yabase field.

Preparations are being made for dual completion wells to exploit the new deep zones in Yabase field, and experiments are being conducted to determine the feasibility of secondary recovery by water-flooding in the shallow Zone III of Yabase field.

In November, two Imperial petroleum engineers visited the U. S. to investigate recent developments in drilling and pro-

duction techniques, secondary recovery methods, and reservoir engineering.

Considerable encouragement was given to oil producers by an increase in the price of local crude in July to 1,482 yen per barrel ($4.10 per barrel at the current official exchange rate of 360 yen to $1). Production by the smaller producers increased notably as a result, and Imperial Oil was able to execute additional projects during the last half of the year.

In October, Imperial successfully floated a new issue of stock which increased its capital from 460 million to 1 billion yen. An amendment to the Imperial Oil law permitted all the new issue to be taken up by private interests instead of the 50 percent holding by the government required by the law. The market price of Imperial shares rose sharply from 20 yen at the beginning of the year after the labor situation was settled, and reached a peak of 380 yen in August after the announcement of the new crude price and the discoveries in Yabase field. The general recession in the stock market during the latter half of 1949 and the floating of the new capital issue reduced the share price to 120 yen in October, with a further recession to 80 yen late in December.

Imperial was released from designation as an excessive concentration of economic power under the Elimination of Excessive Concentrations of Economic Power Law in December, after complying with the order to dispose of holdings in other companies and to relinquish prospecting leases on which no active exploration bearing on the leases had been conducted in the past five years.

Repeal Considered

The question of repeal of the Imperial law to place it in the status of a normal private enterprise was under consideration by the Japanese government, and a draft for an amended Petroleum Resources Development Law was formulated with the object of reducing the degree and type of government control over the producing industry and encouraging exploration for new reserves.

Draft revisions of the Mining Law included a provision for limiting the holding of mineral prospecting rights to a short term so that large areas could not be held indefinitely without any exploration activity, as was the practice formerly.

Imperial effected an important internal reorganization in its technical departments which divided the former Production department, controlled by drilling and production engineers, into an Exploitation department, Exploration department, and Mechanical Operations department. The latter acts as a service department for execution of the plans and projects developed by the evaluation branches of the Exploitation and Exploration departments. This reorganization broke a long tradition in the Japanese industry of control of both planning and operations by drilling engineers, who often paid little regard to the opinions of the petroleum geologists and exploitation engineers on their staffs.

Nippon Mining Company, whose principal business is mining copper and other ore minerals, re-entered the petroleum producing field by acquiring the exploitation rights of Nitto Oil Company in Hachimori field, Akita Prefecture, and prospecting leases in Akita and Aomori Prefectures. Nippon Mining lost its Petroleum Producing department and leases when Imperial Oil was established in 1941, but it has continued to operate its refinery at Funakawa, near Akita City.

The Ube Oil Company's leases in Hachimori field were taken over by Fuji Mining Company, and Nichibei Oil Mining Company took over the leases in Hibiki field formerly operated by Hibiki Oil Mining Company.

Production of oil field gas showed a slight decline from 2,250,000 cubic feet daily in 1948 to 2,220,000 daily in 1949. Decreases were mainly in Hokkaido and Akita fields while Nishiyama field, Niigata Prefecture, showed a slight gain. Production of methane gas showed a tremendous artificial increase from 1,286,000 cubic feet daily in 1948 to 4,417,000 daily in 1949. Most of this increase was due to the fact that production data were not previously recorded from many private companies which own producing gas wells in the Niigata methane gas field. In this area, recorded production jumped from 395,000 cubic feet daily in 1948 to 2,730,000 daily in 1949. Other significant increases, however, were effected in the methane gas fields in Chiba and Shizuoka Prefectures.

As a result of exploration during 1949, methane gas accumulations were discovered in the Osaka district and near Takaoka City, Toyama Prefecture. Many of the local government bodies in Japan are encouraging exploration and development of methane gas to provide both domestic and industrial fuel.

Outlook for 1950

Production of crude during 1950 is expected to show an increase of more than 50 percent over that of 1949. In January, 155,050 barrels of crude were produced. Imperial's production of 147,190 barrels in January was the highest monthly production in its nine years of existence. The most significant factor in increasing production during 1950 will be Imperial's exploitation of the new deep zones in Yabase field. About 20 wells are scheduled for this program. Production from the new deep zone wells completed should bring the total production in 1950 to about 2,200,000 barrels, as compared with 1,368,050 barrels for 1949.

This estimate is considered reasonably conservative because it is based on the present twin-well drilling program tentatively proposed by Imperial Oil. If dual completions are attempted on Zones VIII and IX, the production could be considerably increased. Also, the initial production rates used in the calculation of expected production are considered to be rather low. This estimate of production does not take into account the possibilities of other production from exploitation during the year of areas which may be proved productive early in the year by exploration wells now drilling. The most significant of these is the wildcat on the Tsuchizaki structure west of Yabase field. It was not expected that exploitation of Kawaguchi field, in northern Hokkaido, would begin before 1951 if the deep wildcat now drilling is successful.

Exploration drilling is planned for new deep pools in Karumai field, Hokkaido; for about six wildcats in Honshu; for extensions and new pools in possible stratigraphic traps along the margin of the basin in Niigata Prefecture; for new fault trap pools in the vicinity of Narahashi field, Yamagata Prefecture; and for extensions in several Honshu fields. Exploration survey will continue at a slightly diminished rate because of the reduced subsidy granted by the government for oil exploration, but this will probably be offset by greater coverage in geophysical operations by the use of the new geophysical equipment imported in 1949. Exploration surveys and drilling for methane gas will be conducted in Aomori, Akita, Yamagata, Niigata, Chiba, Toyama, Shizuoka, and Ishikawa Prefectures, and in the Tokyo and Osaka districts.

Drilling and production techniques should show considerable improvement as a result of the visit of Japanese petroleum engineers to the U. S. early in 1950, and it is expected that waterflooding will be attempted in the shallow zones of Yabase field and dual completion practice applied to the deep zones of Yabase field.

Imperial will probably revert to a private enterprise status, and revisions of the Mining Law and Petroleum Resources Development Law should place the producing industry on a more rational basis.

March 25, 1950, an important stage

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was reached in reorganization of the structure of the Japanese petroleum industry by passage through the Diet of a bill for the repeal of the Imperial Oil Company Law of 1941. Repeal of this law accords Imperial the status of a normal private enterprise free from government control of its business operations and without benefit of special privileges accorded by its former status as a partly government-owned corporation. This repeal follows the general policy of placing all phases of the Japanese petroleum industry in the hands of private enterprise.

Future Status

The eventual place of Imperial within the structure of the Japanese petroleum industry has been subject of serious consideration during the past four years. Because it was a partly government-owned corporation and produced more than 90 percent of Japan's crude, it was designated an excessive concentration of economic power on February 8, 1948, under the provisions of Article 3 of the Elimination of Excessive Concentrations of Economic Power Law (No. 207 of 1947). Recognition of the necessity for maintaining an organization with the financial, technical, and material resources to prosecute an intensive search for new crude reserves, as recommended by Natural Resources Section petroleum specialists, to rehabilitate the industry as a whole, and to save future foreign exchange expenditures imported petroleum resulted in the technical organization being preserved intact. After compliance with the order of the Holding Company Liquidation Commission, responsible for administration of Law 207 of 1947, to dispose of holdings in associated companies and to relinquish prospecting leases on which no active exploration bearing on their prospects have been conducted in the past few years, Imperial was released from designation early this year.

A preliminary step in reduction of government control in Imperial Oil was taken in October, 1949, when an amendment to the Imperial Oil Company Law permitting the new capital issue to be taken up wholly by private subscribers was passed by the Diet.

The recent rapidly increasing production, made possible by the greatly improved reserve situation, has fully justified the policy of maintaining a powerful organization for discovery and expeditious exploitation of new reserves. Imperial's greatly improved economic position resulting from increased output is expected to improve progressively in the future in its new status as a private enterprise, although the company is not yet in a position to compete directly with imported crude.

On July 13, 1949, SCAPIN 2027 was issued rescinding restrictions on refining of crude petroleum in Pacific Coast refineries excluding ex-military refineries. The Japanese government was instructed to submit recommendations for repair and rehabilitation of refineries proposed for operation.

On November 28, 1949, SCAPIN 6983-A was issued to the Japanese government approving the latter's plan for repair and rehabilitation of the Pacific Coast refineries as follows:

- The Nippon Oil Company refinery at Yokohama, Kanagawa Prefecture, the Nippon Oil Company refinery at Kudamatsu, Yamaguchi Prefecture, the Showa Oil Company refinery at Kawasaki, Kasagawa Prefecture, the Toa Nenryo Company refinery at Shimizu, Shizuoka Prefecture were all instructed to be placed in operable condition as soon as possible but no later than January 1, 1950. Each of the above refineries was to be capable of receiving and processing imported crude at the rate of 4000 barrels per calendar day into a complete line of refined products.

- The Daikyo Oil Company refinery at Yokkaichi, Mie Prefecture, was instructed to prepare to receive and process fuel oil at the rate of 1000 barrels per calendar day into lubricating oils and asphalt.

- Approval was also given for repair and rehabilitation of the Maruzen Oil Company refinery at Shimotsu, Wakayama Prefecture, to prepare to receive and process imported crude at the rate of 3000 barrels per calendar day into a full line of refined products as soon as possible but not later than April 1, 1950.

- The Toa Nenryo Company refinery at Wakayama, Wakayama Prefecture, was authorized to repair and rehabilitate in preparation for receiving and processing imported crude at the rate of 6000 barrels per calendar day into a full line of refined products as soon as possible but no later than July 1, 1950.

- Approval was also given for repair and rehabilitation of only existing facilities at the Mitsubishi Oil Company refinery at Kawasaki, Kanagawa Prefecture, and the Kos Oil Company refinery at Marifu, Yamaguchi Prefecture, in anticipation of cracking stock for these refineries.

Up to April, 1950, two crude oil purchases for Japan of 960,000 and 2,040,000 barrels, respectively, have been made by the Armed Services Petroleum Purchasing Agency in Washington. In addition, 720,000 barrels have been procured through private import from the sterling area. These purchases will permit operations in six Pacific Coast refineries through June.

$300 Million Development for Canada Foreseen by Stewart

A $300 million program for the development of Canada's oil industry is foreseen by G. L. Stewart, president of Imperial Oil, Ltd. Concerning the rapid investment in petroleum work in Canada, he said:

"In 1949 expenditures of the industry for oil-finding and attendant developments were $100 million or more, and in 1950 they will be even greater. Together with outlays for new refining capacity, for pipe lines and tankers and for other induced expenditures, they will approximate $300 million which is equivalent to 10 percent of the total private capital expenditures that are expected to be made in Canada this year.

"When we think that this is a contribution of only one industry and that it comes only three years after the initial discovery was made at Leduc, we realize what can be accomplished under a system that challenges men to put brains and money to work in order to earn profits by providing necessary supplies and services."

Stewart reported that as of April 15 Imperial had completed 72 development wells in Alberta since the beginning of the year, drilled 8 wildcats, and had 4 others drilling. He said a rough estimate of the company's potential production in Alberta under efficient recovery methods is 60,000 barrels a day at the present time. Actual production is 26,000 barrels daily but an increase is expected this spring and when the Interprovincial Pipe Line begins to take oil for delivery to Superior, although, Stewart said, "we will have a reduction in well-head prices to offset the cost of delivery to more distant markets."

Stewart estimated Canadian per capita consumption of petroleum in 1949 at slightly more than 8½ barrels as against 14½ barrels for the United States. He adds, "Because of the many similarities in the economies of the two countries, it is to be expected that the patterns of our oil consumption will continue to trend toward a closer approximation of U. S. consumption as has been the case in recent years. For instance, since 1945 Canadian per capita consumption has increased by three barrels, or roughly 53 percent, whereas in the same period the increase in the U. S. was about 1 1/6 barrels, or slightly more than 8½ percent."

Speaking at the Spring meeting, Eastern District, API Division of Production at Cleveland, Dr. Oliver B. Hopkins, vice president of Imperial, said Canada is producing nearly 50 percent of her oil needs and should be self-sufficient in a few years.

Knowledge=Cementing Success

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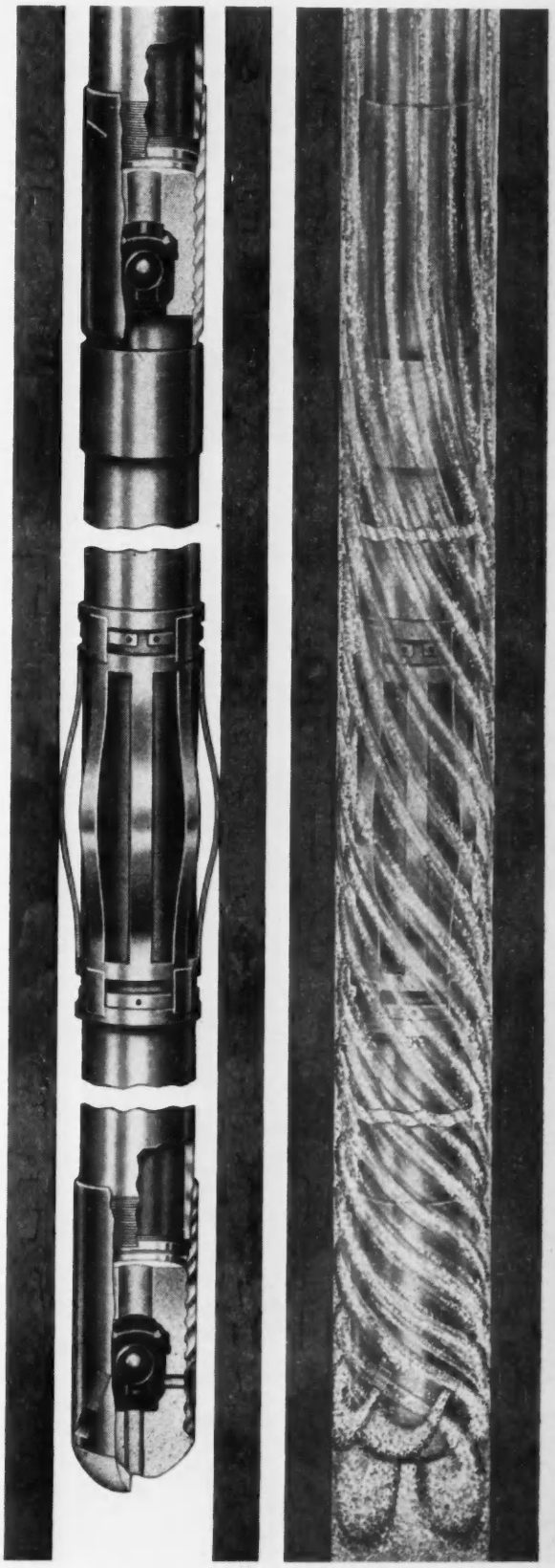
THE DOWNWARD HYDRAULICKING ACTION of the fluid through the baffled, side down-whirler ports of a Baker Whirler Shoe, and through the nozzle-like bottom outlet, effectively removes bridges and permits safe running of the casing.

When washing the formation at the cementing point to condition the hole, the "whirling" motion of the fluid helps remove mud cake from the side walls. This *downward* whirling is far superior to any *side* jetting action.



The view at far right shows the "whirling" motion given to the cement slurry as it is discharged from a Baker Cement Wash-Down WHIRLER Float Shoe, with the shoe joint centered by means of a Baker Model "G" Casing Centralizer. *This same whirling motion given to the circulating fluid, conditions and prepares the wall of the hole immediately prior to the discharge of the slurry.* The whirling action of the slurry, in turn, not only supplements the hole conditioning process, but also ensures that the centered casing will be completely encased with a uniform body of cement and that the hazard of channeling will be reduced to a minimum.

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KEY TO CEMENTING SUCCESS

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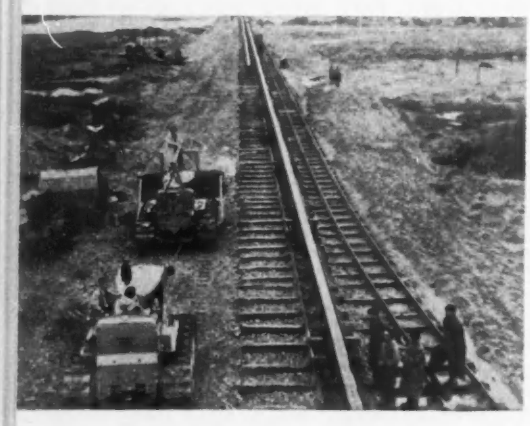
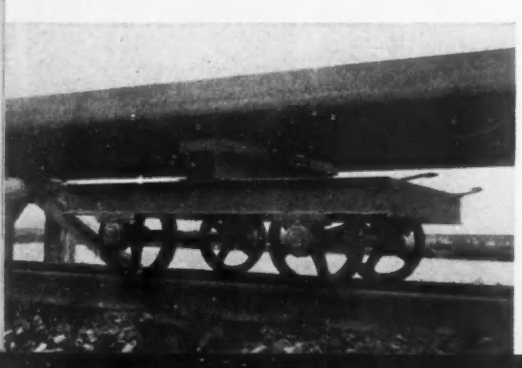
A Sea Line for Frontignan





ONE of the oldest established petroleum refineries in Europe is the Frontignan plant of Socony-Vacuum Francaise. For many years it received its crude stocks by way of the nearby Mediterranean port of Sete. The harbor at Sete is shallow—so shallow that it is unable to accommodate tankers drawing more than 25 feet of water. This, even in prewar days, blocked expansion of the refinery. Postwar expansion of the refinery depended upon providing means by which it could be supplied by modern tankers requiring 33 to 34 feet of water.

Study of the problem resulted in the decision to supply Frontignan from tankers that could anchor more than 1½ miles offshore and deliver their cargo to Frontignan by means of the first permanent sea line to be constructed in Europe.

Construction of the line required extensive preparations. Among these were filling in a large swamp, building a mile-long road, and laying a narrow-gauge railway along the road. Dollies spotted along the railway supported the pipe line as it was drawn by the sea by a tanker that was 1000 feet offshore and connected to the line by cables. When most of the first section of the line, about a mile in length, was in the sea, the operation was halted and a second section was mounted on the dollies and welded to the first. Then the operation was resumed. The sea line was in position when the head had been made fast to three terminal anchor buoys installed 1¾ miles offshore. Ship-to-shore radio communications made possible close coordination of the sea and land phases of the job.

By coincidence, the first tanker to deliver product to Frontignan refinery by way of the new sea line was the "Frontignan of Marseille." The oil carrier was moored to the three terminal anchor buoys. Hoses from the twin terminals of the pipe line were connected to the tanker's discharge lines. Within a few minutes, oil, propelled by the tanker's pumps, was flowing through the sea line toward the crude oil tanks of Frontignan refinery, 1½ miles from the point where the sea line joined the land line on the Mediterranean shore. Europe's first permanent sea line for the delivery of petroleum was in operation.

—Story and pictures courtesy The Flying Red Horse, published by Socony-Vacuum Oil Company, Inc.

TOP TO BOTTOM

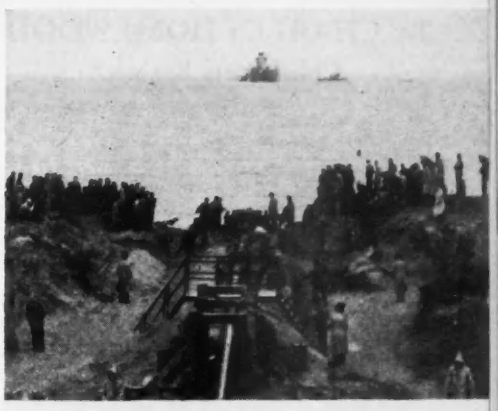
The construction of a sea pipe line required the use of a half million cubic feet of fill in swamp across which a mile of railway had to be built.

Twelve-inch steel pipes were welded together in 33-foot lengths. Steel rings reinforced joints. Later the line received a water-resistant coating.

Sea clamps, each weighing a ton, were placed on the line at intervals. Their weight prevents the line from shifting its position on the sea's floor.

Two hundred four-wheel dollies were required to support the one-mile length of pipe during the launching. As dollies rolled, line moved into sea.

The sea line's two sections: right, one-mile section on dollies before it went to sea, and, to its left, the three-quarter mile length to be added to it.



A thousand feet offshore, a tanker was ready to haul the pipe line into the water. Radio communication between ship and shore aided the operation.

The actual launching began as the head of the line, plugged against water and supported by an oak "sled," was hauled into the sea by the tanker.

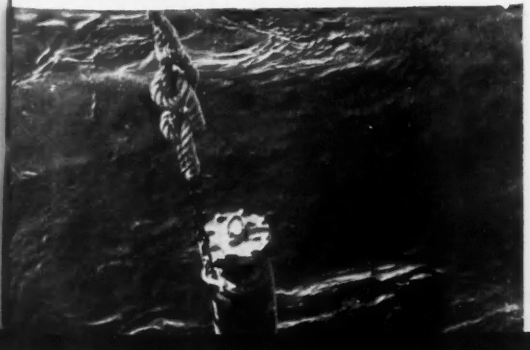
As a final precaution, the long steel line was greased as it passed through an oak "throat" on its journey to the floor of the Mediterranean.

A pit retrieved the dollies as the pipe line slid into the sea. The dollies were then returned to the railway to help carry the remainder of the line.

With a mile of line already at sea, the three-quarter mile section was transferred to the dollies and welded to the first section to form one unit.

Each of the line's three sea terminal anchor buoys, a mile and three quarters offshore, is anchored to block anchors weighing ten tons each.

Each buoy is connected to the block anchors by 100 fathoms of anchor chain weighing more than 25 tons. Sea line job was carefully planned.

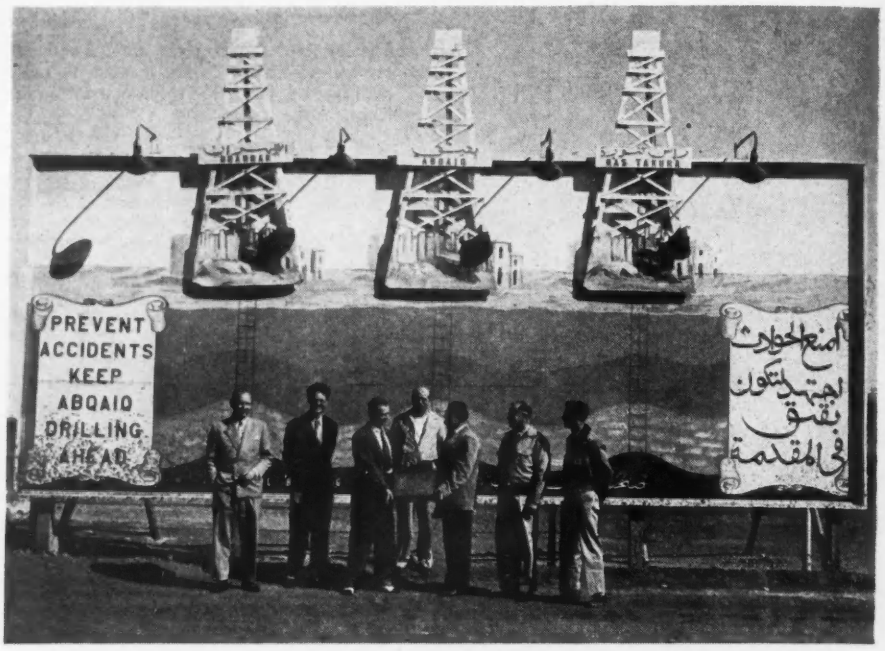


The tanker *Frontignan*, carrying crude oil for the refinery, was moored to the terminal anchor buoys, and the hoses were hoisted aboard ship.

Pumping was started, and the crude oil began to move through the mile and three quarters of sea line, and the mile and a half of land line.

By CHARLES HOMEWOOD
Chief Safety Engineer
Arabian American Oil Company

Safety In Desert Operations



T. V. Stapleton, Aramco general manager, presents safety trophy to C. F. Bevan, Abqaiq district manager. Left to right are R. L. Cundall, assistant general manager-services; C. Homewood, chief safety engineer; Stapleton; W. G. Heberling, Abqaiq district safety engineer; Bevan; A. L. Anderson, manager, personnel headquarters; and P. W. Pederson, assistant safety engineer, Abqaiq.

AN AMERICAN oil company is achieving dramatic results from a safety campaign conducted at its base of operations in Saudi Arabia, 9000 miles from home in the U. S.

In 1949 the Arabian American Oil Company established a frequency rate of 11.1 disabling injuries to every million man hours of work while producing more than 174 million barrels of oil. This figure represents a sharp reduction from the frequency rate of 27.3 in 1948.

What makes the Aramco figure more impressive is that safety education was taught to company employes representing nine different nationalities. More than 12,000 were Arabs. Safety men credit the success of the campaign to wholehearted cooperation between workers and management.

With T. V. Stapleton, general manager, in charge of field operations Aramco sponsors an annual accident prevention contest at Ras Tanura, refining and shipping area; Dhahran, headquarters and employes' community; and Abqaiq, major oil producing center.

The contest is based on the number of disabling industrial injuries per 100 men working in each district. Employes are informed of their district's standing through posters in Arabic and English, publicity in the employes' publication, and on large billboards erected at the plant. The work at Abqaiq consists of drilling and producing occupations classed as hazardous.

The accident prevention program begins with employe recruitment. Physical requirements are high and safety training is rigid. American employes are taught colloquial Arabic and company methods. Saudi Arab employes are given on-the-job training and related classroom work.

Recruits for driving heavy mobile equipment receive special training and rigid physical examinations at the Aramco Driver Schools. A vision of 20-20 in both eyes, without glasses, is demanded. After experience in driving a recruit may be transferred to handling a 20 ton special truck. The driving training program, close supervision of driving habits, and preventive maintenance, have helped to reduce the company's motor vehicle accident rate.

Five American safety engineers and three fire prevention engineers, assisted by a staff of Arab employes, make up the Aramco Safety Engineering division. They advise and assist line supervisors who are responsible for accident and fire prevention.

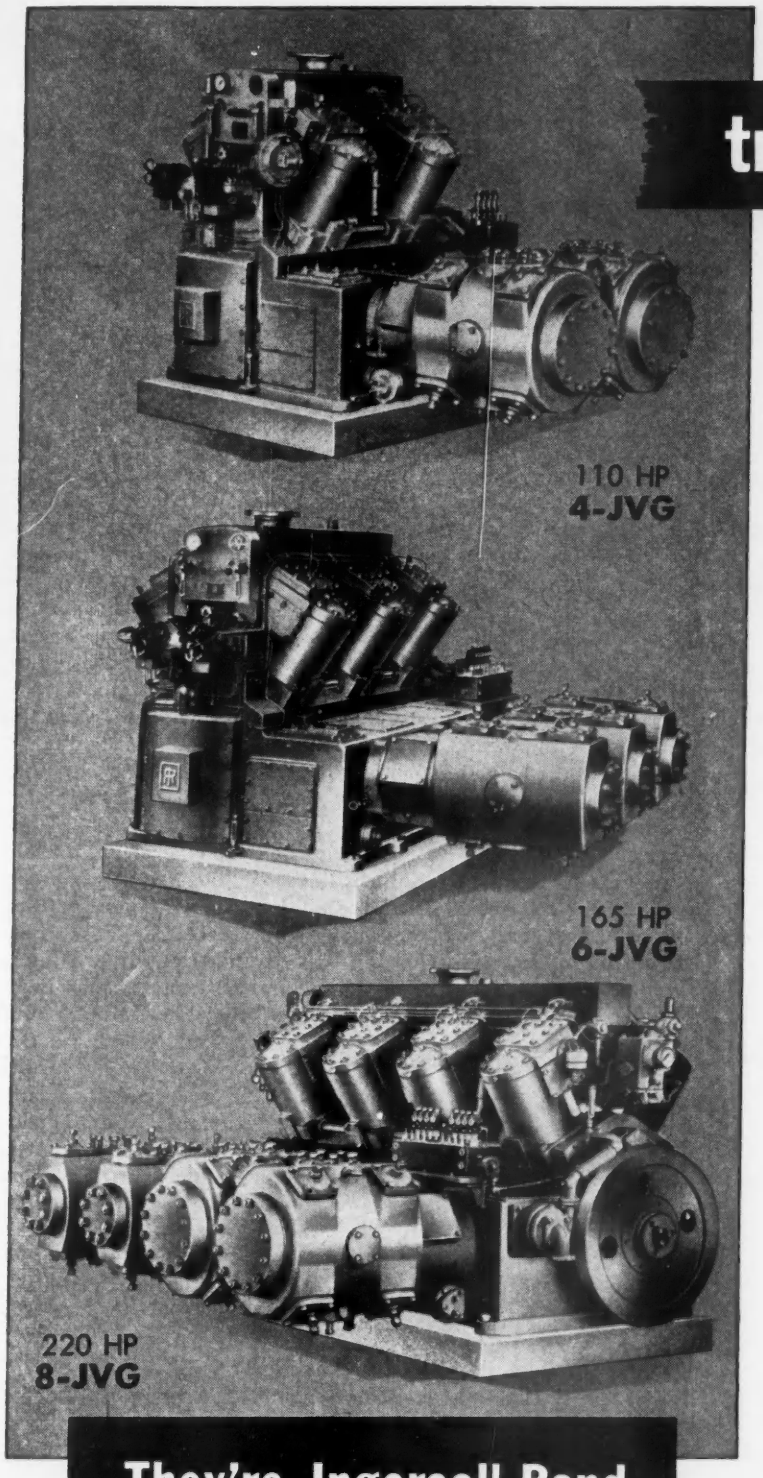
Complete Equipment

Fire prevention is carried out through good engineering and constant alertness on the part of all employes. An investment in fire protection equipment greater than would be made in the U. S. by a company of similar size has been necessary due to the isolation of oil handling facilities. Each Aramco camp is protected by a fire fighting machine which can pump 750 gallons of water per minute plus auxiliary equipment such as a dispenser of high pressure water fog. Employes working about oil handling facilities are trained in the use of water fog and foam fire extinguishing equipment.

To stimulate employes to work safely Aramco conducts a safety poster contest in which Saudi Arabian, American and other employes compete for prizes annually. The three winning posters are chosen by public vote. These then are judged by a committee composed of a Saudi Arabian government official, the American consul and a member of the Saudi Arabian, American and Italian employe groups. In the current contest an American, W. N. Matthew, won first prize and Farid Mahrus, a Saudi Arabian, won second prize. The slogan on Matthew's poster, "Let's Point The Way," was used as the basic slogan for Aramco's 1949 accident prevention program. On Mahrus' poster the slogan read, "Don't Lose or Mar The Rose Of Life."

Saudi Arabian supervisors are made honorary "Safety Captains" and wear badges to remind workmen that safety comes first. The captains help new Bedouin employes to become adjusted to modern industrial methods.

These successful methods of training, engineering and safety publicity will continue to reduce accidents and injuries. Safety men believe that whenever safety methods are attempted with thought and enthusiasm, they help save lives, prevent injuries, and reduce operating costs.



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...and economy!
...and performance!

The light-weight, gas-engine-driven JVG is now available in three sizes ... 110, 165, and 220 horsepower ... for refinery or oil field service. Excellent running balance of these Ingersoll-Rand 4-cycle V-angle compressors, needing only small foundations, makes them ideal for skid mounting and jobs where frequent relocation is necessary.

The JVG is designed for maximum flexibility of loading, to meet any pressure conditions ... any gas ... any service. Maintenance men and operators praise its heavy-duty construction, economy of fuel and lube oil, and simplicity and compactness. They also like the perfect combustion and smooth, quiet 4-cycle operation under all load and speed conditions.

These units will meet your most exacting specifications for high efficiency, conservative rating, long life and low maintenance ... whether the job be for semi-portable use or permanent installation. Consult your nearest I-R representative for complete details.

Horsepower	Width	Length	Height
110	6'-2"	8'-5"	6'-3"
165	8'-3"	8'-5"	6'-3"
220	10'-4"	8'-5"	6'-3"

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JVG
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Types XVG, SVG and KVG gas-engine-driven compressors are available for installations requiring larger horsepower ratings.

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Construction to Start on

Iraq Pipe Line

CONSTRUCTION will start in September on the 32- and 30-inch pipe line connecting Iraq's lush producing fields with the Eastern Mediterranean. Opening of the line late in 1952 will greatly alter the petroleum supply pattern for all Western Europe, especially for France, and will mark Europe's full turnaround from Western Hemisphere to Eastern Hemisphere sources of supply.

The line will be constructed by Iraq Petroleum Company and will run 556 miles from Iraq's Kirkuk field to Banyas on the Syrian coast. It will parallel IPC's present double line system of 12-inch and 16-inch pipe as far as the Homs Gap, Syria, and then will fork north to its terminal 45 miles above the Syrian port of Tripoli. Tripoli is the present terminal of the 12- and 16-inch north leg of the IPC system, while Haifa, Palestine, is the terminal of the South leg. However, the two south lines have been closed about a year because of political difficulties arising out of the Jewish-Arab dispute.

Of the total 190,000 tons of pipe required for the Kirkuk-Banyas line, Consolidated Steel Corporation's Maywood, Calif., plant will roll 166,000 tons, while the rest will come from National Tube Company, another United States Steel Corporation subsidiary. The rolling schedule announced by the mills calls for delivery of 7000 tons a month of seamless and 4000 tons a month of welded pipe during the last four months of this year. Some of the pipe will be stored in Los Angeles for later shipment, and the rest will be shipped as soon as it is produced. The pipe will be 32- and 30-inch to nest for shipment, and the seamless pipe which will be laid between the Homs Gap and Banyas will be 26-inch. Wall thickness will be three-eights- and seven-sixteenths-inch.

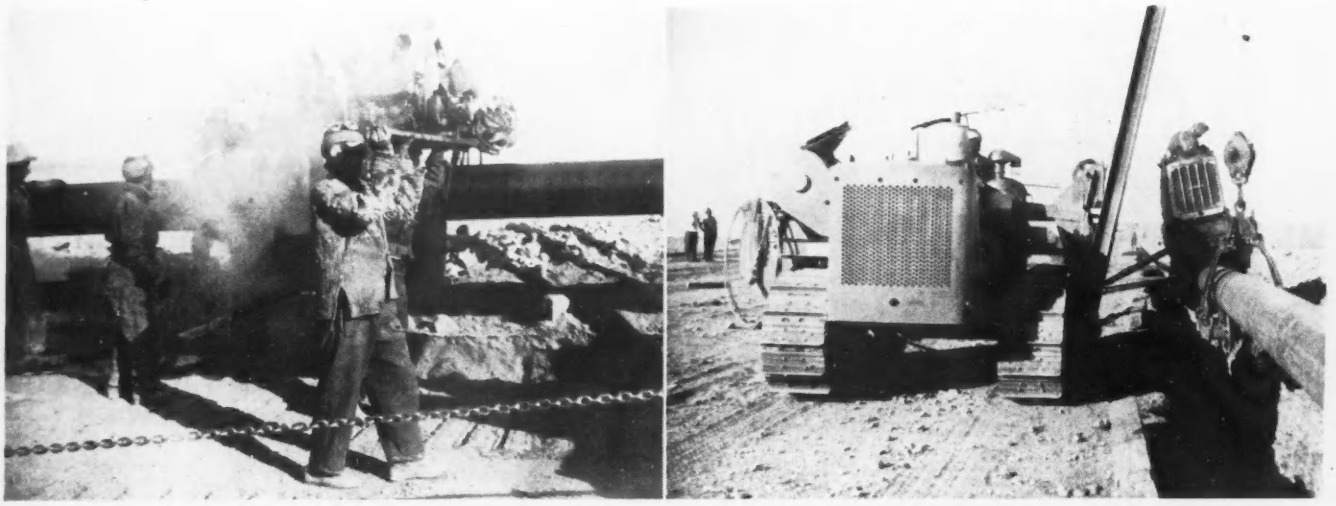
The pipe will be shipped to Basra at the head of the Persian Gulf and from there will be transported by rail to Kirkuk where work will begin. Most of the seamless pipe will go by water to Tripoli and work will proceed on both ends of the line at the same time.

Pump Station Program

The pumping station program for the line has not yet been finalized, but the present intention is for initial construction of three pump stations, and later four more, corresponding to the seven stations now in use for the existing system. However, it has not been decided whether to tie the new line into the present pump station system, or to construct a completely new pumping system.

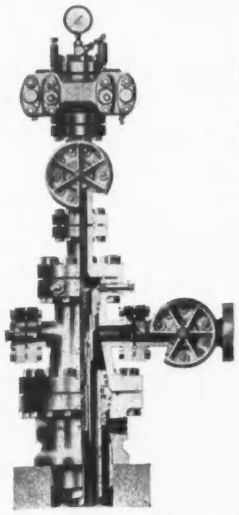
The three pumps with which the line will begin operation will give it a capacity of 275,000 barrels a day, but the whole three-line system eventually will deliver in excess of 500,000 barrels a day to the three end-points of Haifa, Tripoli and Banyas. In case the south leg of the system remains shut down, additional pumps are planned on the north lines to carry the full 500,000-barrel-a-day load.

The new line, together with the old 12-inch line and the recently opened Kirkuk-to-Tripoli 16-inch line, will be the chief carrier of Middle East crude for the French refineries. French interests are one of IPC's four partner-owners, the others being Shell, Anglo-Iranian Oil Company, and Near East Development Company, which in turn is owned equally by Socony-Vacuum and Standard Oil Company (N.J.). France is by necessity an importer of oil but is seeking to refine within its own borders a greater proportion of the crude brought in. After the last war half of France's oil imports consisted of finished products, but by 1947, of the total of 140,000



This 16-inch pipe line, from Iraq's Kirkuk field to Tripoli, now under construction, will soon be joined by a parallel line extending from Banyas, Syria.

GRAY SYSTEMS OF WELL CONTROL INCLUDE THESE DEVELOPMENTS



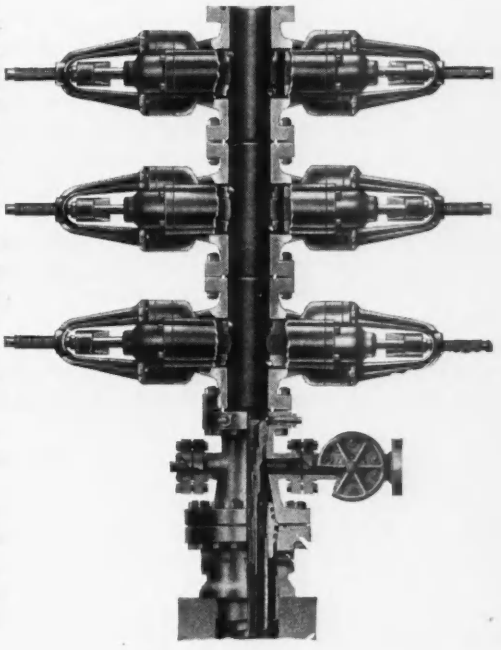
PATENT NUMBERS
2,082,413
2,117,444
2,150,887
2,241,333
2,043,428
Other Patents Pending

RELATED PATENTS
include numbers:
2,241,288
2,148,327
2,207,469
2,485,497
2,442,548
Other Patents Pending

Each feature of an "A.S.A. Series" system of well control is measured by, and must qualify in accordance with, such essential standards as:

1. Complete control throughout the performance of all operations.
2. The highest degree of simplicity, meaning the fewest number of the highest quality parts. This is the first requisite of safe well control, as hazards multiply in proportion to the number of parts used.
3. The minimizing of pressure subject areas, resulting in a proportionate reduction of operating loads. (Strict adherence to this fundamental of hydraulics.)
4. The use of relatively long-lived materials in the permanent flowing structure, especially seals. These seals are the heart of a well control system, the body being merely a housing therefor.
5. The ability to remove for repair or replacement each part when and as it has completed its full operating function.
6. Adapting the whole to the problems peculiar to a given area or a particular company. (That custom touch which is foreign to mass production practices.)

These fundamental standards are an inexorable part of each Gray Well Control study. Consistency in rigidly adhering to these standards looks toward the development of advantages while avoiding disadvantages which so often accompany inconsistent change. (A balanced structure.)

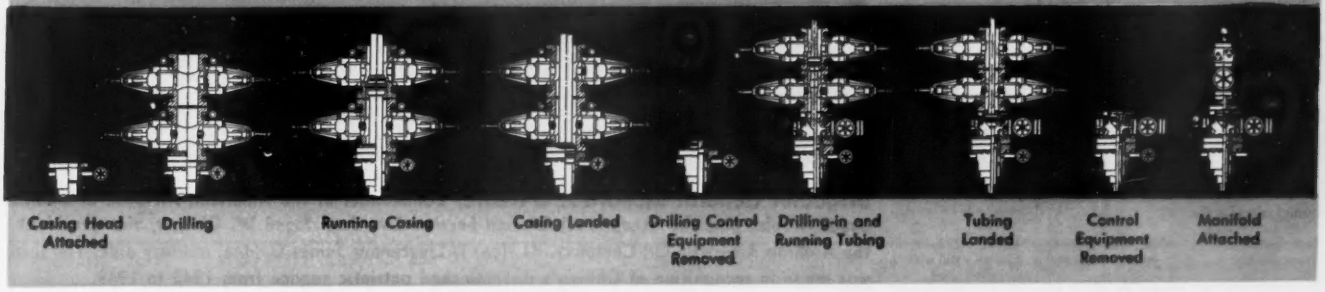


It goes without saying that a standard has no meaning except when measured by the equipment and practices established as being the measurement by which other equipment is to be weighed.

Gray Patented Systems of Well Control have been weighed, accepted, and published by the American Petroleum Institute as its Standard of Excellence for the measurement of other equipment and practices.

GRAY TOOL COMPANY
HOUSTON

Rocky Mountain Representative: CARL MOULDEN, P. O. Box 1890, Casper, Wyoming



barrels a day France was importing, 100,000 barrels daily, or 73 percent, were refined inside France.

Table 1 shows French crude oil imports by four selected years on the basis of country of origin:

After World War II France's critical shortage of oil was met by Marshall Plan aid and by two agreements relating to IPC. The first recognized French rights in the company which had been contested at the time of the liberation; and the second, signed in November, 1948, provided for maximum exploitation of IPC concessions through the construction of a pipe line from Iraq to the Mediterranean. It was in view of this arrangement that French interests dropped a suit they had instituted against the American partners in IPC at the time of their entrance into Arabian American Oil Company (Aramco), a procedure which the French originally contended countered a 1928 agreement to which Jersey Standard and Socony-Vacuum were parties.

Table 2 compares the new IPC line and the Trans-Arabian Pipe Line Company's cross-desert project now building from the Saudi Arabian fields to Sidon, Lebanon.

France is projecting a refining capacity of about 140 million barrels by the beginning of 1953. This will call for $320 million worth of crude. The existing 12- and 16-inch IPC lines will deliver at the rate of 275,000 barrels a day, to which can be added about 80,000 barrels a day produced at Basra and Qatar. The 30-inch line when completed will give France a 50-million-barrel daily share in IPC output, with a commercial value of about $120 million.

Meanwhile, Tapline is proceeding on schedule with construction of its trans-Arabian line despite recent threats by the Syrian government. Tapline now has strung all of the 695-mile main line pipe, and has welded about 675 miles at the rate of about 37 miles a month at the eastern end. Work is also continuing at the western end. About 66 percent of the east program is completed.

The work is converging on Syria, chief danger spot of the Middle East. Tapline at the western end has completed the 24 miles of line across Lebanon and expects to complete the 82-mile stretch across Syria by late June. However, the legality of the concession already granted by Syria for transit rights may be questioned in the country's new constitution. The Syrians are proposing to incorporate in the document a provision that agreements such as the one reached with Tapline must receive parliamentary approval to be valid. Tapline has concluded transit conventions with Saudi Arabia, Transjordan and Lebanon, but its agreement with Syria, if invalidated, might jeopardize the whole $200 million project.

TABLE 1
French Oil Imports
Imports of Crude Oil
(in thousands of metric tons)

Country of Origin	1929	1938	1946	1947
United States	164.8	2,319.8	244.9	574.4
Venezuela	0.5	645.9	884.6	1,998.9
Colombia	23.3	420.1	.....	.....
Arabia	.....	3,146.8	337.4	222.2
Iraq	.....	.....	912.0	1,127.3
Iran	21.8	.....	246.5	591.3
Rumania	17.4	36.4	.....	.....
Other Countries	30.0	412.2	60.7	472.2
Total Crude	257.8	6,981.2	2,686.1	4,986.3

TABLE 2

	Trans-Arabian	Middle East	I.P.C.	
Distance	Abqaiq-Sidon	Persian Gulf-Tartus	Kirkuk-Banias	
Diameter in inches	30–31	34–36	30–32	
Length in kilometers	1,725	1,260	895	
			First Stage	Second Stage
Annual capacity (in millions of tons)	15	25	15	23
Steel (in tons)	385,000	470,000	245,000	290,000
Power (in hp)	80,000	120,000	35,000	105,000

Germany's Oil Production Reaches New High Average

German oil fields in February attained the highest daily average production ever recorded for the country. Reports from the Baden, Emsland, Hamburg, Hanover and Schleswig-Holstein regions indicate that the average production for that month was 20,850 barrels daily. The highest previous figure was posted in 1940 when the daily average for the year was 20,190 barrels. Daily average production for January of this year was 18,900 barrels—a substantial gain over the 1949 average of 16,150 barrels a day.

Jersey Standard Signs ECA Italian Development Pact

The Economic Cooperation Administration announced last month the signing of an industrial guaranty contract with Standard Oil Company (N. J.) for an Italian investment which may save Italy more than $4 million annually on the import of finished petroleum products. The contract was signed by the Export-Import Bank of Washington, acting as agent for ECA.

Jersey Standard will invest $12 million in capital stock of a new Italian refining corporation, STANIC. For this sum Standard will acquire half of STANIC's capital stock. The other half will be owned by an existing Italian company, Azienda Nacionale Idrogenazione Combustibili (ANIC), in which the Italian government owns a substan- interest.

Of Standard's total investment, $10 million will purchase a half interest in existing refineries of ANIC at Bari and Leghorn. These refineries were valued at $12 million in June, 1947, when negotiations with Standard commenced. Since that time, ANIC has spent the equivalent of $8 million for permanent additions and working capital. The remaining $2 million will be spent matching an equal sum advanced by ANIC for the design and purchase of refining equipment in the U. S.

The Bari refinery, which has a present capacity of 12,000 barrels of crude oil per day, will be modernized for more efficient operation at lower cost. The Leghorn refinery, now processing about 7500 barrels of crude per day, will be enlarged to a capacity of about 21,000 barrels per day.

Brigadier General Richard J. O'Keefe, Commander of the American Air Base at Dhahran, Saudi Arabia, pins the Exceptional Civilian Service Award on Floyd W. Ohliger, vice president of the Arabian American Oil Company. At right is Lieutenant James Golden, military aide. The award was made in recognition of Ohliger's distinguished patriotic service from 1942 to 1949.

THE EARLY BIRD GETS THE LEASE

with the new, improved airborne magnetometer

Prospecting has sprouted wings! Today—with precise field data collected swiftly and economically by the improved airborne magnetometer—oil companies can speed their exploration and development programs anywhere in the world.

Perfected by the Gulf Research & Development Co. and field tested by Aero Service, the new magnetometer adds higher sensitivity to aerial magnetic surveying—already the swiftest, least expensive reconnaissance method known. Essentially drift-free and improved in speed of response, this better magnetometer produces maps precise to 1 gamma—the most accurate magnetic maps the world has ever seen. Combined with AERO's detailed photo mosaics, these magnetic maps become invaluable guides in the planning of oil exploration.

AERO's world-wide experience in aerial magnetic mapping brings maximum precision and efficiency to the use of the new, improved airborne magnetometer. For, in the skilled hands of AERO engineers this sensitive instrument will deliver vital intelligence to the conference room at a fraction of the cost and years ahead of ground survey schedules. More important, the information has greater accuracy and detail than possible with conventional ground methods.

Whether you are interested in domestic or foreign oil, an Aero Service magnetometer survey will expedite your exploration plans. Turn this economy of time into cheaper, more favorable leases. Get in on the ground floor of development.

Let our engineers show you how the new, improved Gulf magnetometer plus AERO's world-wide mapping experience can help bring your exploration plans to a swifter, more profitable fulfillment.

TOPOGRAPHIC MAPS • PLANIMETRIC MAPS • PRECISE AERIAL MOSAICS • AIRBORNE MAGNETOMETER SURVEYS • RELIEF MODELS • COLOR PHOTOGRAPHY

Sicily's New Petroleum Law May Stimulate Exploration

COURT validation of Sicily's new petroleum legislation is expected to spur an exploration program on the island. The law is reportedly very favorable for the operations of Gulf Exploration Company and Macmillan Petroleum Corporation, the two American companies now holding concessions in Sicily.

Sicily, a region of Italy, has been held by the Italian constitutional court at Rome to have autonomous powers in legislating on all mining matters. This decision confirms the new oil law passed by the Sicilian regional government for the purpose of attracting outside capital and skills in active development of a petroleum program.

Under the legislation, ratified on March 21, a research permit can be granted by the Sicilian Ministry for Industry and Commerce for a three-year exploration period. Two extensions of three years each are possible. At the end of the initial three-year period the area of the original permit is reducd by 20 percent, and at the end of the first extension period of three years, the area is reduced by another 20 percent of the original size. The operator has full choice in the area to be surrendered, and also can relinquish all or part of the original concession at any time during the entire nine-year period.

The original area must not exceed 100,000 hectares (2.47 acres per hectare) but may be in one continuous block or in several non-contiguous sections.

Obligations on the operating companies are as follows:

- Exploration obligation to start structure drilling not later than two years from the publication of the first research permit.
- A deep-drilling operation must be started within three years from the date of the research permit. Specifications provide for use of a rig capable of at least 5000 feet depth.
- A work program must be carried out, but the terms of this work program are not set forth in the research permit itself, but are subject to negotiation by the company and the Sicilian government.
- Semi-annual reports must be tendered by the operator to the Sicilian regional mining bureau on progress of exploration activities and results obtained.

The operator must pay an annual surface rental of 100 lire (16 cents) per hectare on the area actually held. Commercial exploitation may not be carried out during the exploration period unless the operator converts his original research permit to an exploitation permit which is non-transferable except with the approval of the Regional Ministry. However, if an oil or gas discovery is made before the expiration of the exploration period, the permittee has the right to apply for and obtain an exploitation contract.

The exploitation contract itself will be for not less than 20 nor more than 30 years but may be extended. During the exploitation period the operator must pay an annual rental of 500 lire (80 cents) per hectare of concession area. Royalty payment may be in either oil or cash (subject to negotiation) and ranges from 4 to 20 percent of the value of output. The royalty rate, however, is a fixed rate independent of the amount of production; and is to be determined annually in relation to the net yearly production of the field.

The Sicilian Minister of Industry and Commerce may declare cancellation of the concession in the following cases: non-payment of rental or royalty, expiration of the exploration period without application by the operator for conversion to an exploitation contract, and interruption of the work program for more than six months. A board of arbitration will pass on all issues involved in the forfeiture of contract.

Macmillan Petroleum originally obtained a concession of 70,000 acres in Sicily and began exploration work there in 1943 on the basis of existing geological reports. Prior to that time Mussolini had granted an extensive concession in Sicily to Sinclair, but this grant was lapsed by the company. Much of the geological survey in Sicily has been done by Dr. E. K. Soper, formerly professor of geology at the University of California at Los Angeles and later associated with Signal Oil and Gas Company. Gulf entered later and at the present time is programming activities on the basis of the new legislation which finally clarifies a long-clouded legal status in the island.

Institute of Petroleum Elects 1950-51 Officers in London

At the annual general meeting of the Institute of Petroleum in London officers for the year were elected. C. A. P. Southwell, managing director of Kuwait Oil Company, Ltd., was named president of the council; C. Chilvers, Anglo-American Oil Company, Ltd., was named secretary; and G. H. Coxon, Anglo-Iranian Oil Company, Ltd., was elected treasurer.

The Institute of Petroleum serves the industry in the United Kingdom much the same as the American Petroleum Institute functions for U. S. petroleum interests.

Oil Workers Return to Jobs As Venezuelan Strike Ends

The nation-wide strike of oil workers which affected all but relatively small or remote fields in Venezuela was ended after paralyzing the country's oil industry for more than a week.

Believed to be politically motivated, the strike was called in defiance of previous government warnings that labor controversies should be settled within the established legal framework. In the face of growing agitation, the government had also decreed the setting up of an investigating committee composed equally of labor, industry and government representatives.

During the walkout, the Minister of Labor announced the suspension of the oil workers' unions, blaming the strike on the defunct Accion Democratica political party, popularly believed to be Communist inspired. With the end of the strike, Venezuela became the 12th Latin American country to outlaw the Communist Party.

So effective was the strike that by the third day 35 tankers were tied up in Maracaibo, while refineries whose workers continued on their jobs were threatened with shutdown due to lack of crude from the fields.

Petroleum Association Formed By Group in Western Canada

Western Canada has formed an association to improve internal relations and operations of the petroleum industry and to present common problems to the Dominion and Provincial governments and to the public. Patterned after similar organizations in the U. S., the Canadian group is known as the Western Canada Petroleum Association.

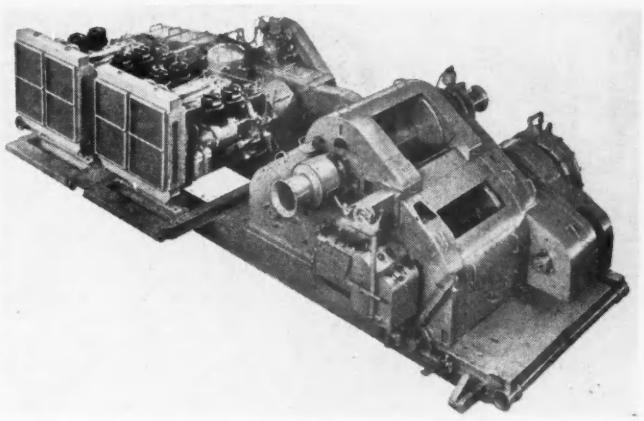
A board of directors elected by the general membership consists of men connected with American and Canadian companies. G. W. Auxier, a member of the Alberta Bar Association, was appointed executive vice president and general manager on a full-time basis. Griffith L. Humphreys is secretary of the association. Headquarters are at 309 Lancaster Building, Calgary, Alberta.

NEW AND IMPROVED EQUIPMENT

SUPPLEMENTING COMPOSITE CATALOG

197—One Package Drilling Rig

This item supplements The National Supply Company data as shown on pages 3433-3564 of Composite Catalog, 17th Edition.



The Ideal Type 50-A Consolidated Rig, rated at a 5000-foot capacity based on the use of 4½-inch drill pipe with 450 horsepower input, is a "one-package" rig incorporating a "narrow type" chain compound drive group to facilitate transportation of the rig intact. The drawworks may also be used with a sectionalized Type "BL" drive group which permits separation into unitized sections.

The main drum has six hoisting speeds and the rotary can be driven at three speeds. Dy-A-Flex air-operated, drum-type constricting clutch is used in both the Master and High Drum Drive positions. The transmission provides three forward speeds and one reverse through the master clutch shaft and jackshaft. Speed selection is made through jaw clutches. An oil shielded inertia brake and its operating air cylinder are located on the master clutch shaft. It is selectively actuated by the master clutch control at the driller's position. The brake facilitates shift of transmission clutches and holds the catshaft when loaded.

Almost every function of the rig is accomplished by air-operated control. All controls are centralized, compact and convenient to the driller's position, and are detachably mounted.

A 10,000-foot sand reel with 38 x 7⅝-inch brake rims is mounted on the catshaft. A jaw clutch keyed to the catshaft drives the sand reel with three speeds available from the transmission.

The chain compound unit is constructed integrally on the extended drawworks skids and enclosed in an oil-tight box welded to the top of the skids. The compound box contains an extension shaft for each engine, a pump jackshaft and all drive sprockets and chain. Cascade lubrication is provided by an oil pump driven by one of the shafts.

Engines are mounted on individual sub bases bolted to the top of the extended drawworks skids and bolted and doweled to the compound box.

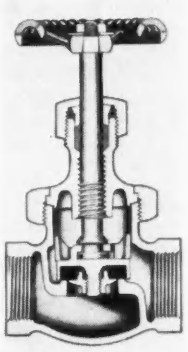
Each section is pre-aligned with its companion unit or units at the factory. Engines can remain permanently mounted on each unit and connected to its complementary shaft extension. An air compressor is standard with auxiliary drive equipment.

For additional information, write The National Supply Company, Box 899A, Toledo, Ohio.

198—LP-Gas Valves

This item supplements Crane Company data as shown on pages 1282-1283 of Composite Catalog, 17th Edition.

A new line of globe, angle and check valves for liquefied petroleum gas service have capacities up to 250 pounds per square inch pressure. All three types have screwed ends and are available in sizes ¼ to 2-inch, inclusive.



For tight seating, a Crane No. 6 composition disc is cemented into the disc holder. Tightness at the stuffing box is provided by one-piece molded asbestos packing.

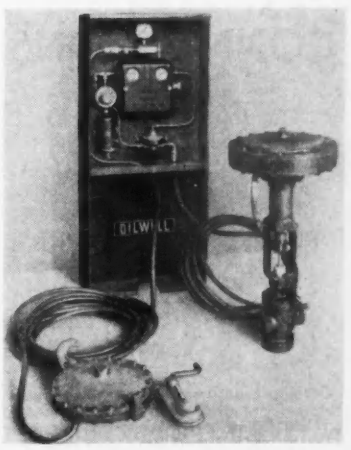
For additional information, write Crane Company, 836 South Michigan Avenue, Chicago 5.

199—Feed Regulator

This item supplements Oil Well Supply Company data as shown on pages 3705-3868 of Composite Catalog, 17th Edition.

The new "Oilwell" Brantly feed control regulator, used in conjunction with the hydraulic feed control, offers a solution to the problem of maintaining uniform weight on the bit regardless of variations encountered in formations. Through a combination of sensitive hydraulic and pneumatic systems, the regulator compensates immediately for changes in weight on the bit, adjusting the rate of feedoff of drilling line by means of a motor valve connected to the feed control.

A dead line diaphragm is hydraulically connected through a pulsation dampener to a Fisher Wizard Pilot. Impulses from the dead line are carried to the Pilot through a closed hydraulic system and, through a pressure gauge principle, actuates a flapper which controls the rate of escape of air from an orifice valve in the air system in the Pilot. As the bit "drills off" and weight on the dead line increases, the increased pressure in the hydraulic system causes the flapper to move closer to the orifice, retarding the rate of air escape and thus increasing the pressure in the air system. This increase in pressure actuates the motor valve, attached to the feed control, opening its valve and allowing



a faster feeding off of line. When bit weight is back to the desired reading, the system reaches equilibrium and feed-off is automatically retarded. The driller can set a micrometer screw on the Pilot to determine the amount of weight to be carried on the bit. This setting adjusts the relative distance between the flapper and orifice and the bit weight selected is reflected on the weight indicator. Air is supplied to the system from an outside source, and is filtered and regulated to a pressure of 25 pounds per square inch.

For additional information, write Oil Well Supply Company, Box 478, Dallas.

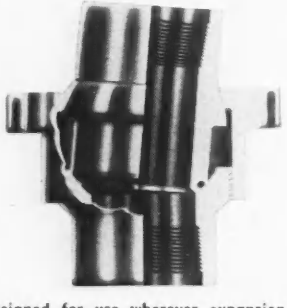
QUICK, ACCURATE RESULTS
LESS EFFORT
Curtin CENTRIFUGES

No. 3420
15 c.c. machine . . . Cranks and heads interchangeable with 100 c.c. machines.

Simple in design . . . Ruggedly built . . . Requires no special care . . . Great Ratio and throw of crank produce required speed with no strain. Curtin Centrifuges meet all *A.S.T.M. Standard Method D-96* and *A.P.I. Code No. 25* requirements. Fully descriptive literature upon request.

W·H·CURTIN & CO.
HOUSTON . . . . NEW ORLEANS.

STRESS-FREE CONNECTIONS



Designed for use wherever expansion and vibration are present, the Yale "Mis-Aligning" Union provides a stress-free connection, with a positive pressure seal assured by service-proved "O-Rings."

Mating members of the union move on two arcs of a true circle, assuring perfect seating and full contact of the O-Ring, sealing surface and retaining surfaces at all times. Because mechanical compression is not required, a certain amount of "swivel" is retained. Even at its greatest mis-aligning angle, there is no restriction of flow through the union.

Yale "Mis-Aligning" Unions are available in popular sizes through your supply store. Try one . . . and discover for yourself its many points of superiority.

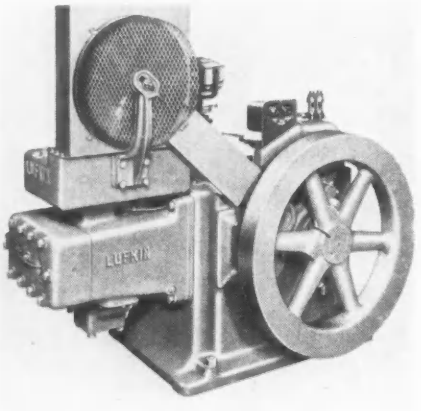
YALE MACHINE WORKS
4403 Yale Street Houston, Texas
Export: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

NEW EQUIPMENT

SUPPLEMENTING COMPOSITE CATALOG

200—Horizontal Engine

This item supplements Lufkin Foundry & Machine Company data as shown on pages 2981-3016 of Composite Catalog, 17th Edition.



Specifically designed for oil field service, the new H-333 horizontal engine is a two-cycle, two-cylinder, medium speed, crosshead construction engine. It has a speed range of 350 to 750 revolutions per minute, with a continuous horsepower rating of 20 horsepower at 425 rpm and 30 horsepower at 650 rpm. The bore is 5½ inches diameter, and the stroke is 7 inches. Total displacement is 333 cubic inches.

This engine is the first two-cycle oil field engine to be equipped with an electric starter, the manufacturer states. It is also the first to offer a combination gas-gasoline carburetor so that the engine may be started on gasoline when natural gas is not available.

Condenser cooling eliminates all water piping and water pumps. Full metallic packing seals the combustion gases from the crankcase, making the engine suitable for sour gas operation. Heavy, one-piece, box-type base allows the flywheel to be above the bottom of the base, permitting installation on any type of pumping unit. The engine is completely waterproof, all accessories being sealed, and a weather cover over the magneto allows the engine to be operated without housing.

For additional information, write for Bulletin E50, Lufkin Foundry & Machine Company, Lufkin, Texas.

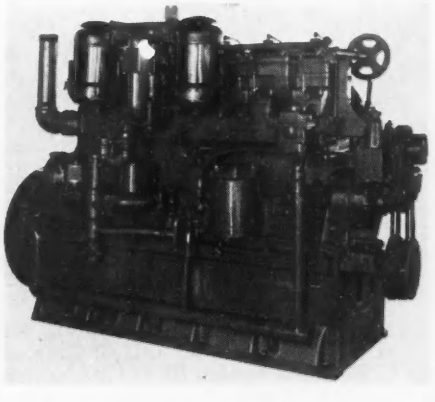
201—Gas-Butane Engine

This item supplements Cummins Sales & Service, Inc., data as shown on pages 1291-1292 of Composite Catalog, 17th Edition.

Cummins Model LI-600 full diesel engines are now available with gas-butane operating equipment to permit use of the most economical and convenient fuel supply. The engine is capable of delivering 280 horsepower maximum when burning 1000 British thermal unit butane or 78 octane gas. When operating on diesel fuel the compression ratio is 16:1, and on natural gas-butane it is lowered to 6.8:1.

The engine has a seven-inch bore and ten-inch stroke. Crankshaft is 5½ inches in diameter and is mounted in copper lead bearings. Rollers are used on all upper and lower cam rocker levers.

Each element of the engine is made into an individual unit that can be removed, including upper rocker arms, lower rocker arms, cylinder heads, removable liners, precision type bearings and overhead valves. Large hand hole plates are removable to permit accessibility to the connecting rods and main bearings, which can be inspected or replaced without taking the engine from the crankcase or the base-type oil pan.



"Tropical cores" are used in the radiator, and full pressure lubrication is incorporated into the engine. Weight of the engine is 10,400 pounds with radiator.

The engine can be converted to diesel operation by removing the gas-butane operatory equipment and reinstallation of diesel equipment. A gas-butane conversion kit is also available for converting present Cummins diesels to natural gas-butane.

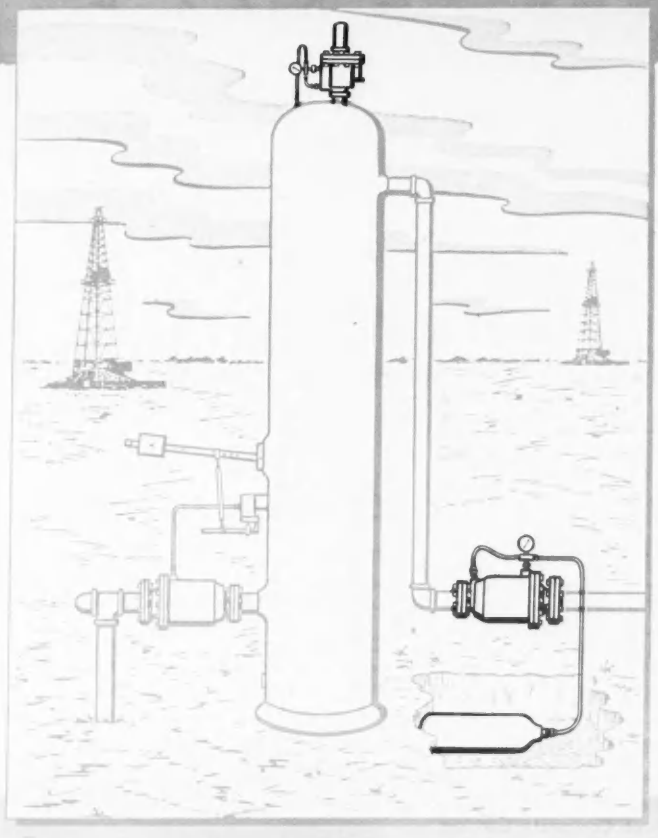
For additional information, write Cummins Sales & Service, Inc., Mid-Continent Building, Fort Worth 2.

Save Time—Write Direct

As a service to readers, all items in WORLD OIL include the complete mail address of the manufacturer. This makes it possible for those desiring additional information to write any manufacturer without the delay occasioned by going through offices of WORLD OIL, and enables subscribers to request specific data in which they are particularly interested.

GROVE

MODEL 888 PRESSURE LOADED RELIEVER



ON GAS SEPARATOR LINES

- HOLDS CONSTANT PRESSURE
- ASSURES TIGHT SHUT-OFF WITHOUT MOVING METAL PARTS

The unique operating principle of the Grove Model 888 Flexflo Reliever makes its action smooth and positive. This dependable service cannot be obtained from any other valve. There are no moving metal parts, springs, or weights to stick and jam. Pressure does the work, opening and closing the Flexflo Reliever with positive action.

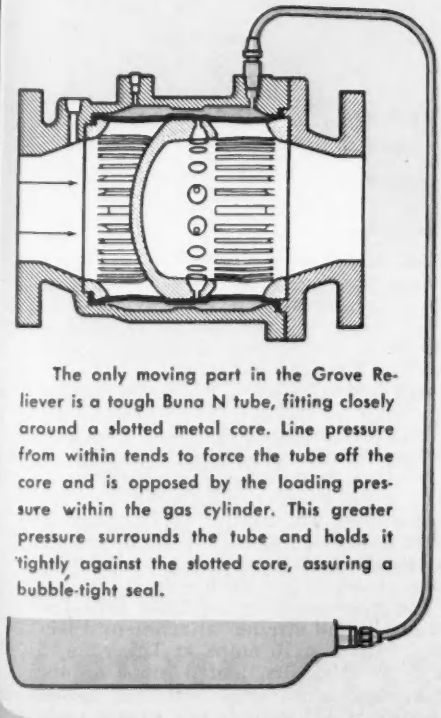
As a back pressure regulator, the Grove Reliever will unfailingly hold a constant pressure on the Separator and insure operation at maximum efficiency.

In the vent line the Grove Reliever will give dependable protection against excessive pressure and eliminate the expense and waste of leaking gas.

Specify Grove Model 888 Relievers with the proved Flexflo principle on your Separators for the best in efficient, trouble-free service.

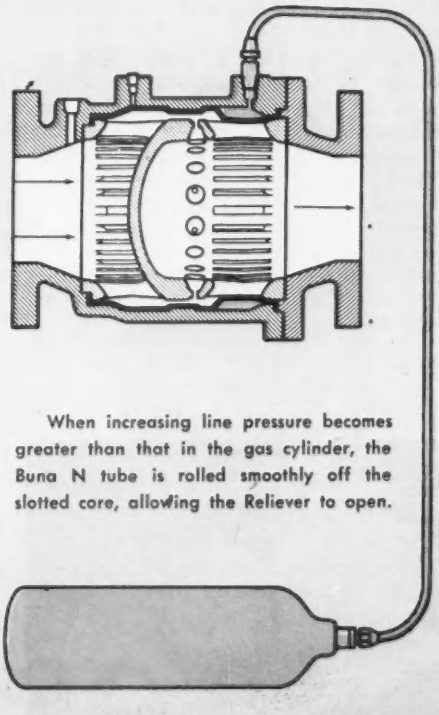
FLEXFLO LETS PRESSURE DO THE WORK

CLOSED POSITION



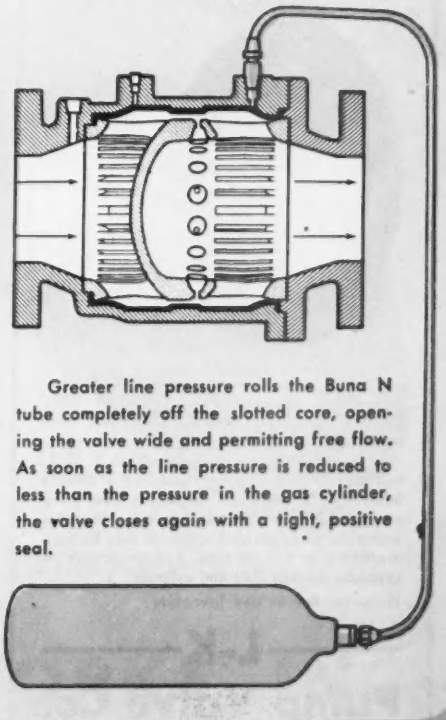
The only moving part in the Grove Reliever is a tough Buna N tube, fitting closely around a slotted metal core. Line pressure from within tends to force the tube off the core and is opposed by the loading pressure within the gas cylinder. This greater pressure surrounds the tube and holds it tightly against the slotted core, assuring a bubble-tight seal.

PARTIALLY OPEN POSITION



When increasing line pressure becomes greater than that in the gas cylinder, the Buna N tube is rolled smoothly off the slotted core, allowing the Reliever to open.

WIDE OPEN POSITION



Greater line pressure rolls the Buna N tube completely off the slotted core, opening the valve wide and permitting free flow. As soon as the line pressure is reduced to less than the pressure in the gas cylinder, the valve closes again with a tight, positive seal.

GROVE REGULATOR COMPANY

3608 NAVIGATION BLVD., HOUSTON, TEXAS • 6529 HOLLIS ST., OAKLAND, CALIF. • 1930 W. OLYMPIC BLVD., LOS ANGELES, CALIF.

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Everything in the Cathodic Protection Field from an Insulating Washer to a Turnkey Contract Installation.

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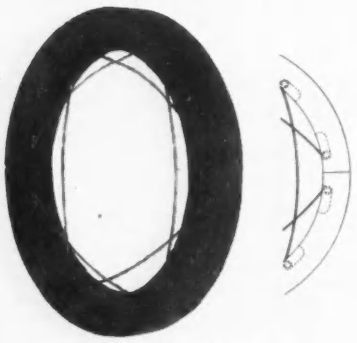
310 Thompson Bldg.
Phone 2-9857

L-K Press-Rite Piston Rings for Pumps and Compressors



(Patent Pending)

Advantages of Press-Rite Expanders with, Double Segment, Segmental Rings over conventional Segmental rings:

1. Uniformity of expansion doubled. 2. One-half amount of fatigue to expanders. 3. Double amount of flexibility. 4. Segments wear more uniformly. 5. More practical to use with metal segments. 6. Additional segments may be used according to size of ring. 7. Less danger of expander fouling ring and cylinder.

Write for details and literature.

L-K Pump Valve Co.

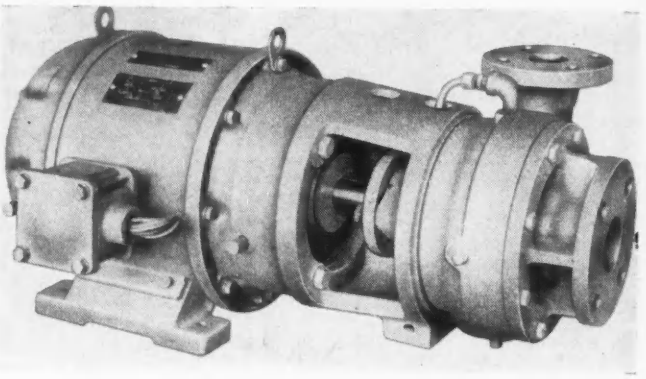
P. O. Box 901 HOUSTON 1, TEXAS

NEW EQUIPMENT

SUPPLEMENTING COMPOSITE CATALOG

202—Bulk Station Pump

This item supplements Byron Jackson Company data as shown on pages 901-1000 of Composite Catalog, 17th Edition.



A mechanical seal effectively limits the hazard of leakage during operation of a new Type TLB bulk station pump. The pump will handle gasoline, butane, diesel fuel, lubricating oils and other hydrocarbons.

The unit is a single-stage, single-suction pump, close coupled to an explosion-proof motor. It has capacities to 600 gallons per minute, discharge pressure to 75 pounds per square inch, and temperature range to 150° F.

For additional information write for Bulletin 50-9200, Byron Jackson Company, P. O. Box 2017, Terminal Annex, Los Angeles 54.

203—Chemical Feeder

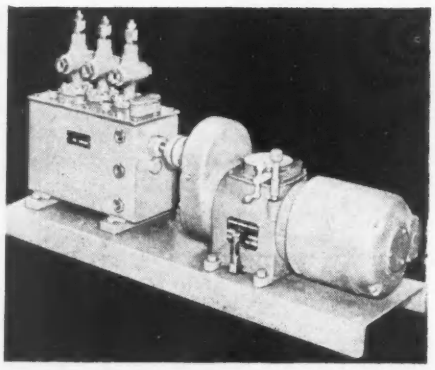
This item supplements Manzel, Inc., data as shown on page 3038 of Composite Catalog, 17th Edition.

Capable of pumping against pressures of 300 pounds per feed, a new large capacity chemical feeder is adjustable up to one gallon of liquid per minute per feed.

Multiple units are available with any number of feeds, operated by rotary, motor or lever drive. Pumping units may be constructed of various materials to meet special requirements.

The feeder automatically injects the chemical in exact proportion to the amount of liquid being pumped. Only the pumping unit comes into contact with the chemical, as the entire driving mechanism operates in an enclosed oil filled case.

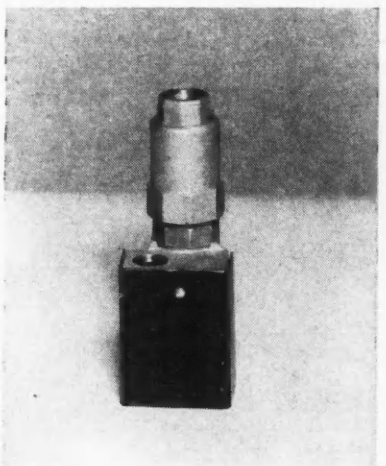
For additional information write Manzel Division of Frontier Industries, Inc. (Manzel, Inc.), 244 Babcock Street, Buffalo 10, N. Y.



204—Water Flow Control

This item supplements General Electric Company data as shown on pages 1809-1820 of Composite Catalog, 17th Edition.

The flow interlock, a new control device which responds to a flow of cold water to open or close an electrical contact, measures approximately 2½ x 3 x 7



inches. In operation it closes a contact when a flow of water exceeds a preset amount and opens it when the flow falls below the preset amount. It acts as a fuse in a circuit which depends upon water cooling for protection.

Adjustment can be made to control the circuit for any flow from one to four gallons per minute. The flow differential between the cut-in and the cut-out of the electrical contact is 0.2 gallon minimum and 0.4 gallon maximum. The interlock does not control the amount of water flow, but this can be accomplished by installing a throttling or regulating valve ahead of the device.

The mechanism is available with union fitting and strainer attachment. Electrical rating is 10 amps at 125 volts, 5 amps at 250 volts, and 3 amps at 460 volts, alternating current. Maximum line pressure is 125 pounds per square inch.

For additional information, write for Bulletin GEC-411, General Electric Company, Schenectady 5, N. Y.

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THAT SERVES ALL PURPOSES THAT IS ASSEMBLED AND OPENED BY HAND

"ALL-PURPOSE" SNATCH BLOCKS

SUPER SAFETY TYPE

The "All-Purpose" and Gin Pole Block Adaptable to Trucking, Drilling Rig or Production Work

This revolutionary LeBus Block is built for Speed and Safety. As shown at right, the block opens for line with no need for tools. Block is left hanging—hinge pin is turned 90° and pushed through slot—the side plate turned to one side and the line inserted.

Patents Pending

- Drop Forged, Alloy-Steel Heat-Treated Hooks, Swivel Yokes, Body Side Plates, Flame-Hardened Line Groove Sheaves, One Piece Ground Sheave Pins, One Piece Swivel Yoke Hinge Pins.
- Bronze Hub Caps on Sheaves to Prevent Sparking and Side Plate Friction.
- Alemite Oiling, Brass and Felt Oil and Dust Seals in Sheaves.
- Precision Construction
- No Threaded Nuts or Bolts to Burr
- No Sparking Danger
- No Accidental Opening by Jarring or Vibration
- No Tools Required to Assemble and Disassemble

As Tail-Board Block

May be changed to Tailboard Type Block by removing hook and yoke assembly—or may be purchased as shown. Available immediately.

All Popular Sizes for manila and wire line—working load capacities from 6 tons through 25 tons.

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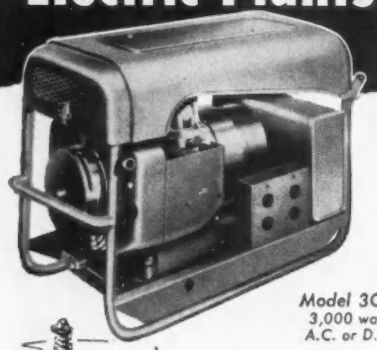
P. O. BOX 2352 — PHONE 1232 — LONGVIEW, TEXAS

ONAN *Oilfield* **Electric Plants**



Model 3CK
3,000 watts
A.C. or D.C.

HEAVY-DUTY PORTABLE & STATIONARY MODELS

Diesel, Gas, Gasoline-powered

● ONAN oilfield electric plants provide dependable light and power for oil field applications. A complete range of A.C. and D.C. models... all conservatively rated for continuous, dependable service helps you choose the right plant for the job. Lightweight, air-cooled models from 400 to 5,000 watts; heavy-duty, water-cooled, gas-gasoline-driven plants from 3,000 to 75,000 watts. Air-cooled Diesel electric plants 2,500 and 5,000 watts. Water-cooled Diesels from 12,500 to 75,000 watts, powered by IH engines.

Write for Literature

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The Positive Leak Preventer

RECTORSEAL #1

Rectorseal #1 is a sure preventative for connection leaks on your rig—mud, steam, water or oil and gas lines.

It has been proved in service for 12 years in all types of extreme conditions of pressures and temperatures. It's a positive leak preventer.

It's easy to apply—economical—a little goes a long way. Available in convenient size cans at your supply store. Or write—

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Manufactured by

RECTOR WELL EQUIPMENT CO., INC.

Fort Worth, Texas

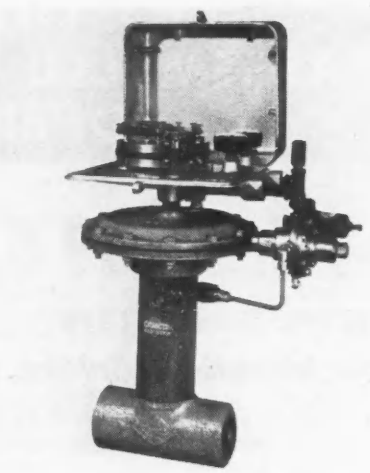
MAKING THE OIL INDUSTRY SAFER

NEW EQUIPMENT

SUPPLEMENTING COMPOSITE CATALOG

205—Valve Control

This item supplements Camco, Inc., data as shown on pages 1015-1022 of Composite Catalog, 17th Edition.



A new gas lift valve time cycle surface control unit with an all-contained motor valve consists of only three parts: a diaphragm motor assembly, a valve case and the valve itself.

The diaphragm assembly is anchored to a cylindrical drip, and a tube within the drip conducts the diaphragm plate stem to its contact with the independent valve stem. To keep the diaphragm plate and stem in suspension when no pressure is above the diaphragm, a full collapsing monel conical spring is placed in a recess under the plate and around the stem. The drip is fed directly from the downstream side of the valve through a port sealed from the plate stem case and atmosphere by "O" rings. The drip chamber is self-purging.

The valve case is a seven-inch long cast steel body, drilled for two-inch line pipe connections with one-inch conductor tubes cored into the body.

The valve consists of a seating insert, the valve stem and the stem sleeve. The valve assembly may be of varying gas passage capacities from one inch down. The standard size is three-fourths inch.

For additional information, write Camco, Inc., Scanlan Building, Houston.

206—Heavy Diesel

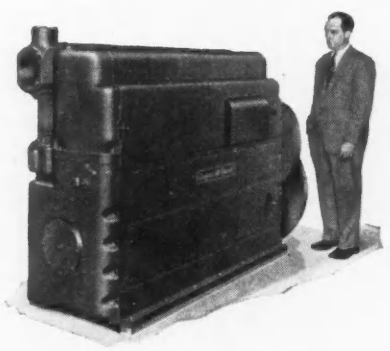
This item supplements Ingersoll-Rand Company data as shown on pages 2465-2472 of Composite Catalog, 17th Edition.

A new diesel engine in the 195-375 horsepower range, is a four-cycle, seven-inch bore, 8½-inch stroke, single-acting engine with a weight of about 30 pounds per horsepower, and a fuel consumption of 0.40 pound per horsepower-hour.

Cylinders are provided with replaceable, wet-type liners and individual heads with overhead valves and intake and exhaust valve-seat inserts. The thick-wall, long-skirt pistons are of aluminum alloy, with ventilated oil-scraper rings above and below the full-floating piston pins. The balanced crankshaft is short and strong, with a 5¼-inch diameter at both crankpin and main bearings, eliminating torsional vibration without the use of dampers.

Both the main and crankpin bearings are provided with aluminum alloy, full-floating, interchangeable shells. The camshaft, blower, water pump and lubricating-oil pump are all gear-driven from the flywheel end of the machine, permitting power take-off from either end. Individual fuel injection pumps serve each cylinder, with two single-hole, nonclogging nozzles per cylinder. The engine is full-pressure lubricated throughout, and is equipped with a gear-driven mechanical supercharger which supplies air for increasing initial pressure in the cylinders and for scavenging during the latter part of the exhaust stroke.

Normal starting is by 250 pounds per square inch air admitted to all cylinders in turn through a starting-air distributor. Other methods of starting are also available. The TS diesel may be mounted either on a concrete base, or on welded-steel skids.



It is available in six or eight in-line cylinder designs, capable of delivering 195 to 375 horsepower at 900 to 1000 revolutions per minute.

For additional information write Ingersoll-Rand Company, 11 Broadway, New York City.

Save Time—Write Direct

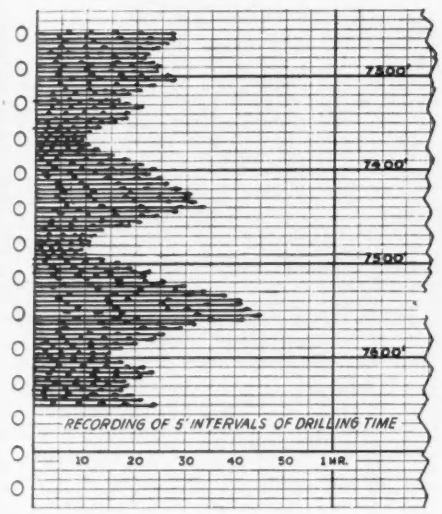
As a service to readers, all items in WORLD OIL include the complete mail address of the manufacturer. This makes it possible for those desiring additional information to write any manufacturer without the delay occasioned by going through offices of WORLD OIL, and enables subscribers to request specific data in which they are particularly interested.

NEW EQUIPMENT

SUPPLEMENTING COMPOSITE CATALOG

207—Interval Indicator

This item supplements Warren Automatic Tool Company data as shown on pages 4910-4913 of Composite Catalog, 17th Edition.



A new drilling time selector has been added to the "Log-O-Graf" to plot five- and ten-foot intervals of drilling time on sample logs.

A new scale selector has also been added whereby the instrument will now record on one inch to the hundred feet, in addition to two inches and five inches to the hundred feet. With scale selector set on one inch and time selector set on five feet, the instrument will automatically plot a graph that can be correlated directly with sample logs.

During the drilling of either five- or ten-foot intervals, the stylus momentarily engages the chart at the completion of each foot drilled, and when the selected interval has been drilled the stylus will engage the chart and mark a horizontal line back to its normal zero position.

From this record, the geologist can see all breaks that might occur during the drilling of any five or ten-foot interval.

For additional information, write Warren Automatic Tool Company, 1920 Hussion Street, Houston.

208—AC-DC Coating

This item supplements Stoody Company data as shown on pages 4637-4639 of Composite Catalog, 17th Edition.

New AC-DC coatings have been added to several of the Stoody electrodes formerly limited to direct current application only. Among these are Stoodite, Tube Borium, and Borod. The graphite-type base of the new coatings eliminates slag interference and produces a stable arc.

AC-DC Stoodite deposits have approximately the same properties as the regular Stoodite. Penetration is slightly lower, and Rockwell hardness is C-56. It possesses high resistance to abrasion as well as to galling and pitting, and polishes under abrasion.

AC-DC Tube Borium contains uniformly sized particles of pure tungsten carbide in mild steel tubes. It is slightly faster in deposition rate and possesses a more stable arc than standard Electric Tube Borium.

The Borod for AC-DC application is similar in construction to Tube Borium but contains finer borium particles.

For additional information, write Stoody Company, 11934 East Slauson Avenue, Whittier, Calif.

In the American Tradition

PRESERVE YOUR FREEDOM!

American free enterprise is often called a "profit" system. But there is nothing sure about the profit, in most cases. Investors hoping for a profit also assume the risk of loss. A better name would be "profit and loss" system.

Despite the risk, hope for profit attracted enough money in the past to build over 4,000,000 successful American businesses . . . and helped free Americans produce the world's highest standard of living.

But now, this hope for profit seems in danger of being destroyed. And whatever destroys or diminishes this hope, kills the incentive for either the risk or effort on which our national prosperity depends.

Let's reverse any such destructive tendency.

Get Safer, More Efficient Drilling with SPANG Prosser-Type Swivel ROPE SOCKETS

The HIGHER STANDARD

SPANG CABLE TOOLS made by SPANG & CO. BUTLER, PA.

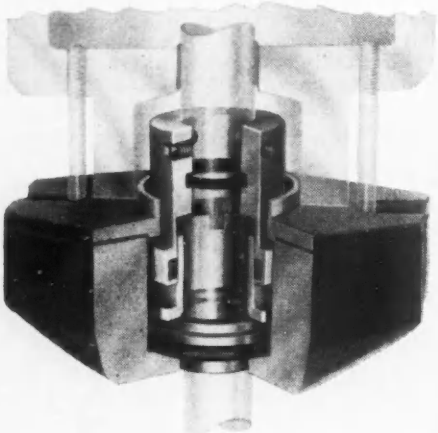
for

OIL WELLS • GAS WELLS • ARTESIAN WELLS
SHOT BLAST HOLES • PROSPECT DRILLING

SPECIFY SPANG—FOR SALE BY DEALERS EVERYWHERE

OTHER NEW AND IMPROVED EQUIPMENT

209—Rotary Shaft Seal



Custom manufactured to match a wide range of applications, a new mechanical rotary shaft seal prevents the fluid leakage experienced with conventional type packings. Fabricated to fit any pump, the Repsco seal compensates for both end thrust and misalignment in the pump. It is hydraulically actuated and balanced by fluid pressure within the pump.

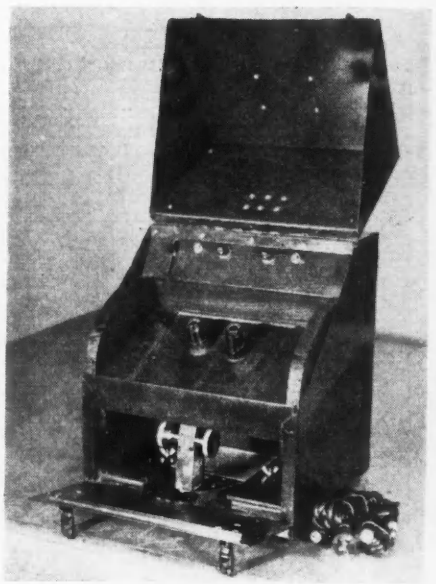
For additional information, write Republic Supply Company, National Standard Building, Houston.

210—Metal Conduit

A new Geon-covered flexible metal machine tool conduit may be used for electrical shielding purposes in many applications. The abrasion-resistant cover is applied over a highly flexible galvanized steel convoluted steel tubing. Liquid-tight steel fittings are usable with both standard and water-tight conduit boxes. They are attachable and re-attachable by the user or can be permanently attached by the manufacturer. Conduit is manufactured in sizes from ⅜ to 2-inch inside diameter, and is available in mill lengths or cut lengths.

For additional information, write Chicago Metal Hose Corporation, 1304 South Third Avenue, Maywood, Ill.

211—Fluoroscope



A new model fluoroscope for examining drill cuttings enables field men and geologists to mount a microscope inside the fluoroscope and examine samples under either ultraviolet or white light. This eliminates the necessity of picking out fluorescent particles from the tray and transferring them to the microscope for further examination. It makes it unnecessary to carry two units (fluoroscope and microscope) in separate cases. The white fluorescent lamp provides a pure white light without the heat of an incandescent lamp.

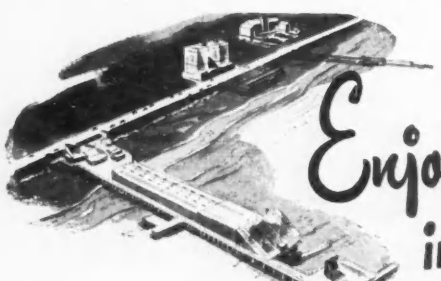
For additional information, write Arthur H. Messersmith, Arvel Industries, P. O. Box 3133, Monroe Street Station, Wichita Falls, Texas.

212—Alloy Pipe

Continuous weld pipe of Yoloy steel is now available for use where corrosion and abrasion are problems, and where lighter weight construction is important. The high tensile strength pipe bends and fabricates readily and is easy to weld, the manufacturer states. Yoloy, a nickel-copper low-alloy steel, has been manufactured as seamless pipe, sheets,

plates and structural members, but is now offered for the first time as continuous weld pipe.

For additional information, write The Youngstown Sheet and Tube Company, Youngstown 1, Ohio.



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Miles of white glistening sandy beach for sunning, turquoise healthful surf for swimming and fishing, top-flight name orchestras for dancing in the Pleasure Pier's beautiful air conditioned Marine Room . . . For superb hotel accommodations, on the beach there is gracious HOTEL GALVEZ with the beautiful new private swimming pool for guests, and the metropolitan HOTEL BUCCANEER. In downtown Galveston . . . HOTEL JEAN LA FITTE.

Also in Galveston . . . Coronado Courts, Miramar Courts, Hotel Cavalier, Jack Tar Court Hotel.

Use our reservation service! Call, write, or wire your nearest Affiliated National Hotel.

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LOUISIANA
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TEXAS
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HOTEL EDSON....Beaumont
HOTEL BROWNWOOD....Brownwood
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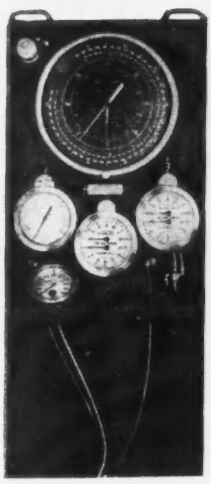
HOTEL TRAVIS....Dallas
HOTEL CORTEZ....El Paso
HOTEL TEXAS....Fort Worth
HOTEL BUCCANEER....Galveston
HOTEL GALVEZ....Galveston
HOTEL JEAN LAFITTE....Galveston
CORONADO COURTS....Galveston
JACK TAR COURT HOTEL....Galveston
MIRAMAR COURT....Galveston
HOTEL CAVALIER....Galveston
HOTEL PLAZA....Laredo
HOTEL LUBBOCK....Lubbock
HOTEL FALLS....Marlin
HOTEL CACTUS....San Angelo
HOTEL MENGER....San Antonio
ANGELES COURTS....San Antonio

VIRGINIA
HOTEL MOUNTAIN LAKE..Mountain Lake
HOTEL MONTICELLO....Norfolk

These MARTIN-DECKER Instruments Cover Every WEIGHT CONTROL NEED

Martin-Decker Instruments Accurately Control Weights, Pressures, Speeds, and Other Important Drilling Factors to Insure Maximum Hole per Dollar.



THE MARTIN-DECKER TYPE "D" Weight Indicator

The Master Drilling Control Instrument positively unaffected by atmospheric temperature changes. Accuracy is unimpaired by small amounts of air in the system, leaks, or fluid volume. It shows the Weight-On-Bit by the magnified Vernier method. (Set the NET-WEIGHT-ON-BIT DIAL on 0 and read.) All readings are shown directly in pounds.

A Conventional Weight Indicator gives Total Weight of the Drill String—showing tight hole, stuck pipe, load on derrick, etc.

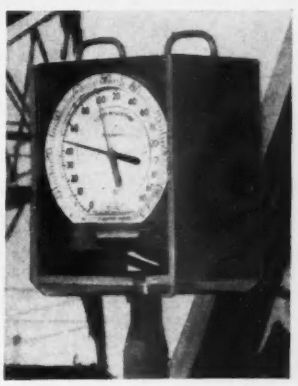
A Simple Recorder gives the engineer a permanent record of each twenty-four hours of operation. The Gauge is placed in front of the driller where the slightest change in hook load or bit weight is instantly revealed.

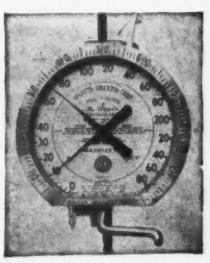
Requires No Adjustment for Number of Lines Strung or Cable Diameter. No Gadgets or Shims to Get Lost. Built-in illumination provides greater safety and convenience. Furnishes precise WEIGHT-ON-BIT DIRECTLY IN 1,000 LBS. and also hook load and derrick load DIRECTLY IN POUNDS.

The Production Model CLIPPER SEALTITE Weight Indicator

Provides all types of small rigs with the same weight indicator, accuracy, sensitivity, ruggedness, and dependability as big rigs.

A Martin-Decker Production Model Weight Indicator can be placed anywhere you want it, at the brake, in front of the driller, over next to the line permanently attached to the mast, without danger of damage from dead line vibration or whip, and with it you can read your loads with precision in pounds. Equipped with supersensitive vernier for maximum sensitivity and readability.





THE CLIPPER TOOL PUSHER Weight Indicator

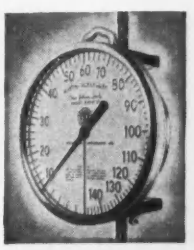
Accurate, easily carried in a car. It can be installed in a minute. Ideal for emergency fishing and drilling jobs.

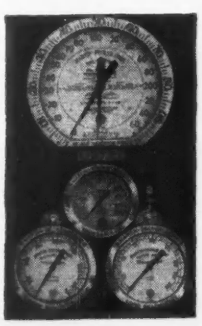
THE SEALTITE Drilling Control Instrument

An outstanding recording instrument for every job where you want full drilling information, indicates and records weight, mud pressure, torque, and shows rotary table speed. Completely closed and sealed fluid system. Illuminated for night reading. Has capacity to handle 20,000-ft. wells. Gauge readings are smooth, sensitive — accurate. Available with metric dials if desired.

THE SLIM HOLE Weight Indicator

For shallow field and core testing work not exceeding weights of 150,000 lbs. with six lines.





THE CLIPPER SEALTITE Weight Indicator and Drilling Control Instrument

Provides the driller with information on all important drilling factors —not just weight alone. Combines all the advantages of Sealtite construction — ruggedness—accuracy—sensitivity—in a small compact case for jackknife derricks, folding masts, and derricks with limited floor space.

THE UNITIZED MUD PUMP GAUGE

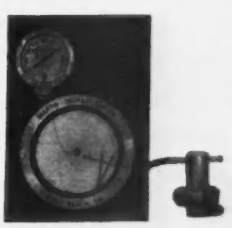
A compact, self-contained, easy-to-install instrument for measuring slush pump pressures. Available in 1,000, 3,000, and 5,000-lb. capacities.

THE 2-PEN CEMENT PUMP RECORDER

(For pressures up to 15,000 lbs.)

Gives a detailed record of pressures encountered while putting away the cement in an oil well and gives the time required for the job.

Write for the Martin-Decker Catalog.



HOME OF THE WEIGHT INDICATOR

MARTIN DECKER CORP.

LONG BEACH, CALIFORNIA

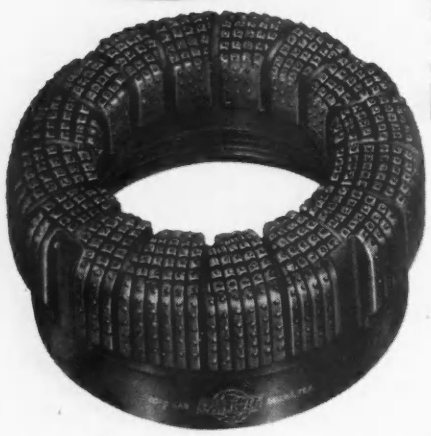
SAN JOAQUIN VALLEY: T. J. CULLEN, BAKERSFIELD, CALIFORNIA
MID-CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS
CANADIAN DISTRIBUTOR: REED ROLLER BIT COMPANY OF CANADA, LTD., CALGARY & EDMONTON, ALBERTA

Condensed from an eye-witness account: — "James M. Townsend, president of the Seneca Oil Co., was fascinated with the possibility of boring for oil. His first step was to hire a man named Edwin L. Drake, a retired conductor on the New York and New Haven Railroad. Illness had forced Drake to quit work and he gladly embraced the opportunity for change of air and scene. Shrewd, farseeing Townsend addressed legal documents and letters to 'Colonel' Drake, no doubt supposing this would enhance the importance of his representative in the eyes of the Oil-Creek backwoodsmen. Provided with $1000 as a starter, Drake and his family arrived in Titusville in May 1858, and were quartered at the American Hotel which boarded him, Mrs. Drake, two children, and a horse for six-dollars-and-a-half per week. Behold then, the man who was to revolutionize the light of the world, his mind full of grand purpose, his pockets full of cash, snugly ensconced in the comfortable hostelry."

Complete sets of eleven "Those Were The Days" illustrations, printed in two colors on paper stock suitable for framing, are available to you free of charge. Use coupon printed below.

THESE ARE THE DAYS

to get set with Core Lab's *SPIRAL-SET* Diamond Core Bits, Barrels and Service!



General Purpose Spiral-Set Diamond Bit, recommended for coring in medium abrasive formations.

Designed by engineers who have, *for years,* observed the field performance of virtually every type and brand of coring equipment – and serviced by engineers who recognize the vital importance of economical coring and complete core recovery, Core Lab's *Spiral-Set* Diamond Bits are available in exclusive cutting face patterns to fit all specific drilling and coring conditions. *Call the Core Lab man nearest you.*

CORE LABORATORIES, INC., Box 5810, Dallas, Texas

Forward a free set of "Those Were The Days" illustrations to:

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CORE LAB

DIAMOND CORING EQUIPMENT AND SERVICE

OTHER NEW EQUIPMENT

213—Plastic Panels

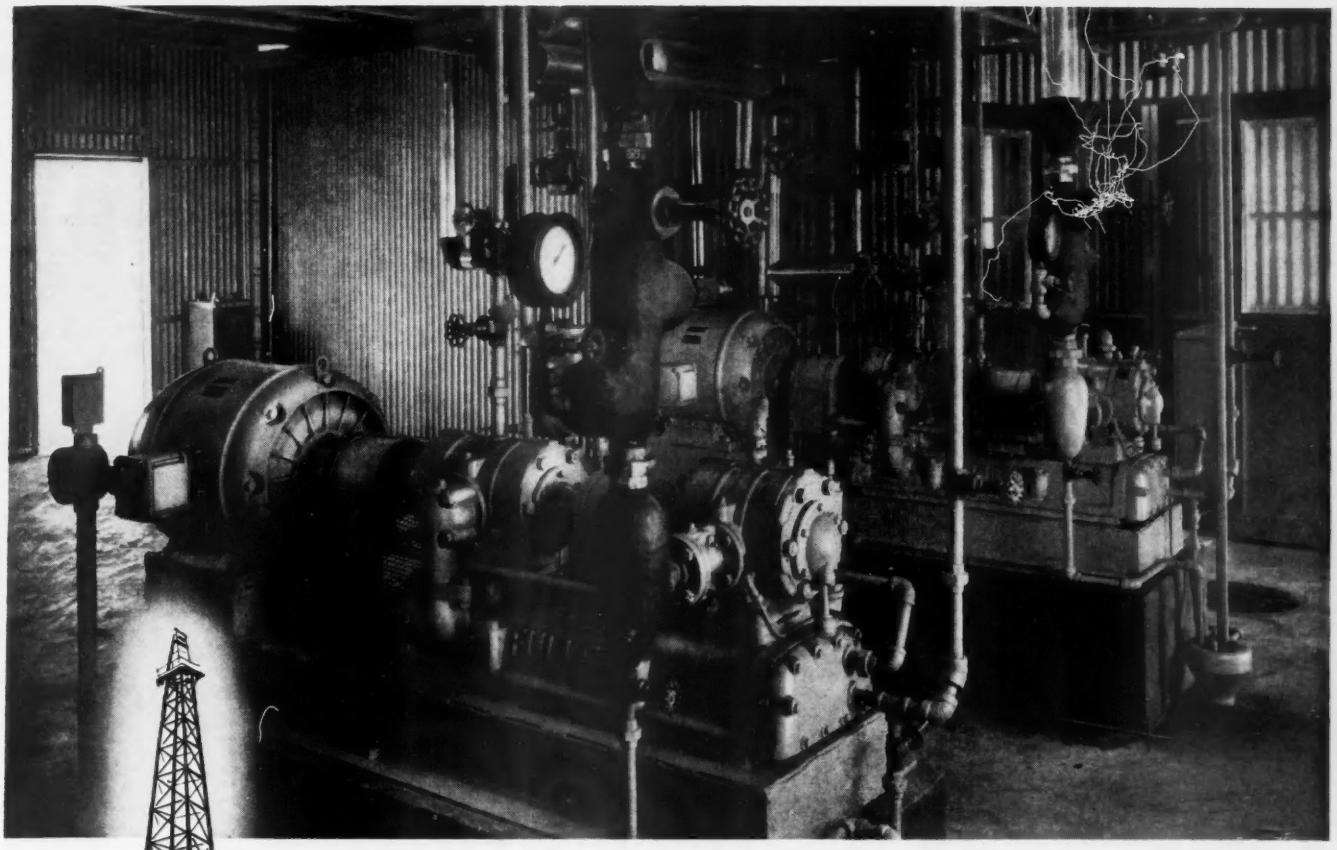
A new corrugated, translucent structural and decorative panel, Corrulux, is made of a combination of polyester resins and Owens-Corning Fiberglas. The shatterproof panels provide optimum diffused light in skylights, and are strong enough to be used interchangeably with corrugated steel, aluminum or asbestos. The material has the strength of mild steel, and is impervious to mildew, humidity, rot, salt water, direct sunlight and most industrial fumes.

For additional information, write Corrulux Corporation, P. O. Box 6524, Houston 5.

214—Gas Mask

To protect welders on jobs where there are hazardous gases or smokes due to product residue or vaporization, a new full vision gas mask can be used interchangeably with dust and fume canister or a compressed air supply unit. The complete outfit is furnished in a compact carrying case.

For additional information, write Acme Protection Equipment Company, 3037 West Lake Street, Chicago 12.



WHEN WE SAY "A FULL LIFETIME OF NEW MACHINE EFFICIENCY"

WE MEAN IT! FULLER ROTARY COMPRESSORS

Fuller has been building rotary compressors for petroleum refiners for many years. In that time, Fuller Compressors have earned a solid reputation for complete dependability under all operating conditions and in all sorts and kinds of locations.

That's because Fuller Compressors are engineered to have a full lifetime of new machine efficiency and reliability. They have a minimum of moving parts—the rotor, bearings and blades. Blades automatically compensate for wear—there are no valves to leak or seats to grind—no need for frequent inspection and servicing.

That's why Fuller Rotary Compressors are ideal for use on gathering lines where you need to boost pressure to trunk line level. You can spot them where you need them—and always be sure they'll be on the job, tirelessly and dependably. If you're interested in boosting gathering line pressure most efficiently and economically, we suggest you get in touch with a Fuller Engineer. And for your own files, why not write today for Bulletin C-5, which describes and illustrates Fuller Rotary Compressors in detail.

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

Pressures to 125 psig.
Capacities to 3300 cfm.

C-201

fuller

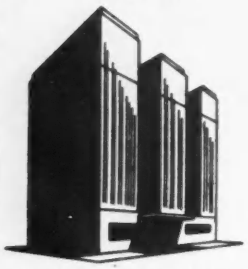
DRY MATERIAL CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS, AND ASSOCIATED EQUIPMENT

Where Oil and Gas Men
STOP and GO in Oklahoma City

And for a fun-packed weekend - Make it a point to spend "A Weekend at the Skirvin" at our new package rate.

Your weekend includes . . .

- A modern, comfortable Skirvin room (from Saturday noon until 5 P. M. Sunday).
- Saturday Evening at the fashionable new Persian Room which includes . . . Dinner, Beverages and Dancing to the music of a leading hotel orchestra.
- Breakfast in bed Sunday morning, or in the Coffee Shop if you prefer.
- Free adjacent parking.
- All for a "package rate" of $16.00 for two, or $9.00 for one.

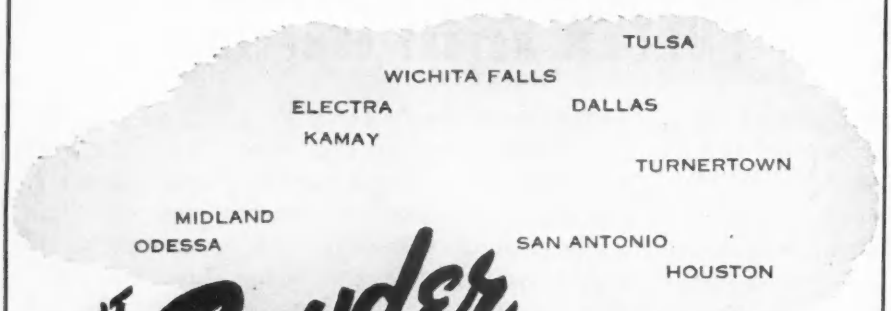


When making reservations, *please specify "Weekend at the Skirvin."*

DAN W. JAMES PRESIDENT

the Skirvin OKLAHOMA CITY

ANNOUNCING . . . A NEW
INDUSTRIAL SUPPLY STORE



AT Snyder

. . . AND A NEW MIDLAND OFFICE

To provide complete, on-the-spot service to oil men in Scurry County and West Texas, the Industrial Supply Company proudly introduces two new branches: a store at Snyder, and an office at Midland. Our experienced staffs and full stocks provide for every oil field need.

INDUSTRIAL SUPPLY CO.

STORES: Wichita Falls, Freer, Kamay, Odessa, Electra, Turnertown, Snyder
OFFICES: Tulsa, Dallas, Houston, San Antonio, Midland

OTHER NEW EQUIPMENT

215—Electric Plant

Two new electric plants provide sources of current in places not reached by central station service, portable power for many jobs, or current for stand-by or emergency uses.

The 70-pound, 350-watt plant can be transported in the trunk of a car. The 750-watt, 115 volt, alternating current model will operate 30 25-watt lights at one time, or power tools with motors not exceeding ¼ horsepower. The automatic model starts when any light, appliance or motor is turned on and stops when all loads are turned off. The plants are powered by one cylinder, air-cooled engines.

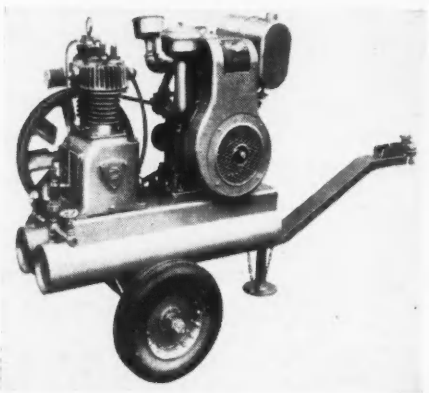
For additional information, write Kohler Company, Kohler, Wis.

216—Compressor

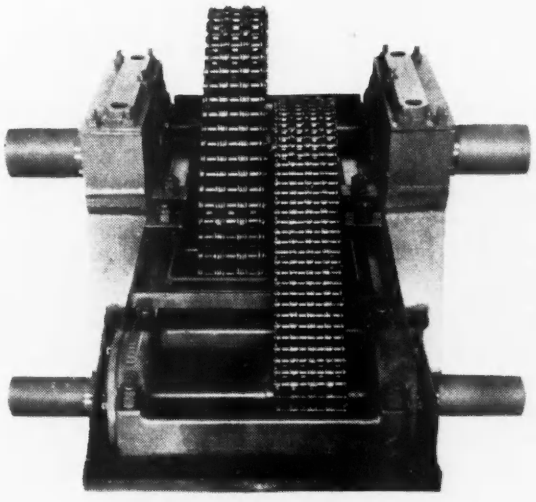
A new trailer-mounted portable compressor is designed especially for operating small air tools. The unit has air-cooled compressor, V-belt drive to gasoline engine, and pipe tank type base. It is equipped with semi-pneumatic rubber tired roller bearing wheels, drawbar, trailer hitch and stabilizer leg.

Three sizes are available.

For additional information, write Gardner-Denver Company, 100 Williamston Street, Quincy, Ill.



For Tough Oil Well Pumping Service
DIAMOND CHAIN RUGGEDNESS Adds Dependability



Speed Reducer for pumping,
—multiple Diamond Roller Chain.

Typical scratch-gauge record, "controlled starting" test.

● In tough continuous pumping service, Diamond Roller Chain driven rigs provide dependable year 'round performance.

Uniformly strong Diamond Chains well withstand the variations in loading while their inherent elasticity helps reduce the intensity of shock loading on other parts of the installation. Diamond drives create no end thrusts or separating forces.

Long records made on wells all over the world—have proved the reliability and economy of Diamond Roller Chains.

DIAMOND CHAIN COMPANY, Inc., Dept. 485, 402 Kentucky Avenue, Indianapolis 7, Ind. *Tulsa Office:* 2238 Terwilleger Blvd.

Offices and Distributors in all principal cities.

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

217—Inspection Unit

The drilling crew can use the Sonoflux Vibro Magnetic unit to inspect subs, drill collars, tool joints, equipment and tools, as well as engine parts, at the rig. The inspection unit is available for either AC or DC 110-volt current, weighs approximately 75 pounds, and is mounted on rubber tired wheels.

The article being tested is vibrated while in the magnetic field, thereby requiring a smaller magneto motive force to obtain the necessary intensity of magnetization. The inspected article does not retain magnetism after inspection.

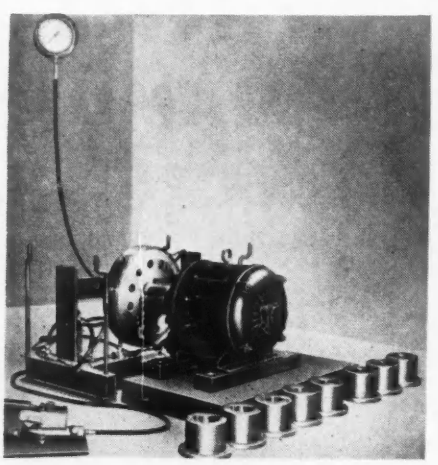
To operate, the unit is plugged into the specified electrical outlet, and the article to be inspected is centered in the coil. "Sono-Powder" is sprayed on the article and blown off; the remaining powder outlines any break or fracture in the surface of the article.

For additional information, write the Sonoflux Corporation, Oil and Gas Building, Houston.

218—Dynamometer

Dynamometer SA-484 of 30 to 300 foot pounds capacity, is for load testing large electric motors. It is placed directly on the test floor, and has jack screws for raising it to the correct height for connection to the motor to be tested.

Adapters for various sizes of motor shafts are furnished with the hydraulic dynamometer, as well as 0 to 300 foot pound laboratory test gauge and foot control cylinder.



For additional information, write Wagner Electric Corporation, 6382 Plymouth Avenue, St. Louis 14.

219—Ultra-Violet Lamp

An adapter which allows the new Mineralight Model SL ultra-violet lamp to operate on 110-volt direct current can be used by drilling contractors who use ultra-violet light to study core samps and for other analytical work. The adapter enables the lamp to operate on 110-volt alternating current, 110-volt direct current, or on battery.

For additional information, write Ultra-Violet Products, Inc., South Pasadena, Calif.

First in
CANADA'S OIL FIELDS

Alberta today is one of the most active areas of oil exploration in the world with almost double the number of producing wells and output than a year ago. The Royal Bank, with 57 branches in Alberta, opened its branch in the oil field territory in Turner Valley in 1928 and followed with branches in Leduc, Devon and Redwater as development expanded. We know the oil fields and the men responsible for the development.

Our branches in Calgary and Edmonton can supply up-to-the-minute and factual information for operators, equipment manufacturers and all who seek sound advice on establishing connections in Western Canada.

If you have any interest in Canada's oil fields, address your enquiry to:

E. B. Durham, *Supervisor*
The Royal Bank of Canada
Calgary, Alberta

Canada's "Oil" Bank

See the Royal about Canada's oil

Over 730 branches in Canada, the West Indies, Central and South America. New York, London, and Paris. Head office, Montreal.

ASSETS EXCEED $2,334,000,000

THE ROYAL BANK OF CANADA

50,000 Miles - No Wear!

1. Five Years' Driving in 70 Days! Racing over hot Mexican-border highways, six brand-new cars put amazing new Conoco Super Motor Oil to one of the toughest tests ever devised. After 50,000 miles of continuous driving, engines *showed no wear of any consequence* . . . in fact, an average of less than one one-thousandth of an inch on cylinders and crankshafts!

2. New-Car Gasoline Mileage! Amazing result: average gasoline mileage for the *last* 5,000 miles was 99.77% as good as for the *first* 5,000. This test showed that Conoco Super Motor Oil, with regular care and proper drains, can keep your new car *new!*

3. New-Car Power! Quicker Starts! Yes—Conoco Super Motor Oil's *extra protection* keeps that showroom smoothness year after year! Only Conoco Super OIL-PLATES metal surfaces to make your engine last longer, perform better, use less gasoline and oil! Conoco Super Motor Oil keeps your engine *new* and *clean!*

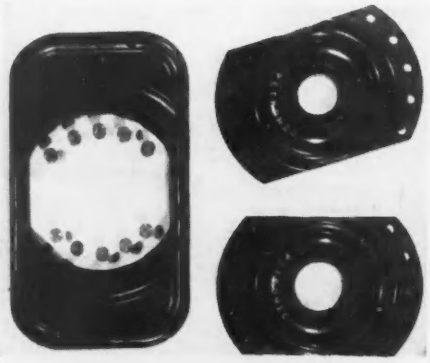
NEW CONOCO Super MOTOR OIL

© 1950 CONTINENTAL OIL COMPANY

220—Pipe Wiper

A new drill pipe wiper has a single body to accommodate different sizes of inserts for various pipe sizes. A floating accordion action allows the Flex-Lip wiper to follow the pipe on any off-center condition so that the wiper is always in contact with all parts of the pipe. The wiper can be installed or removed without pulling rotary bushings.

For additional information, write Petroleum Mechanical Development Company, 3803 South Main Street, Houston.

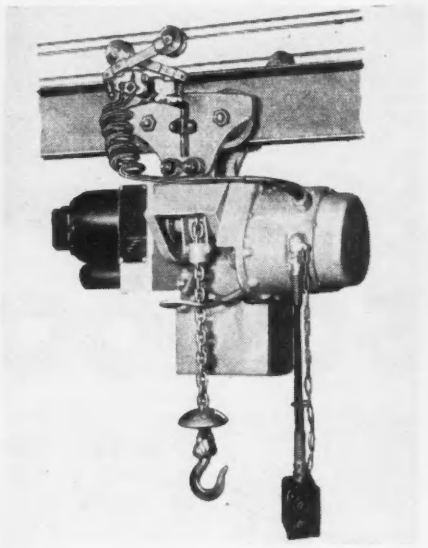


221—Electric Hoist

Lifting speeds up to 41 feet per minute, a lower as well as an upper limit stop, and a wide pickup angle are claimed for the new chain-type Load King electric hoist.

The hoist is available in load capacities of 500, 1000, and 1500 pounds. Standard models lift loads through any height up to 40 feet. Link chain, over an electrically driven sheave, supports the load. This permits extra long lifting lengths since wound-up chain does not wrap around a drum but collects in a metal container as the hook raises.

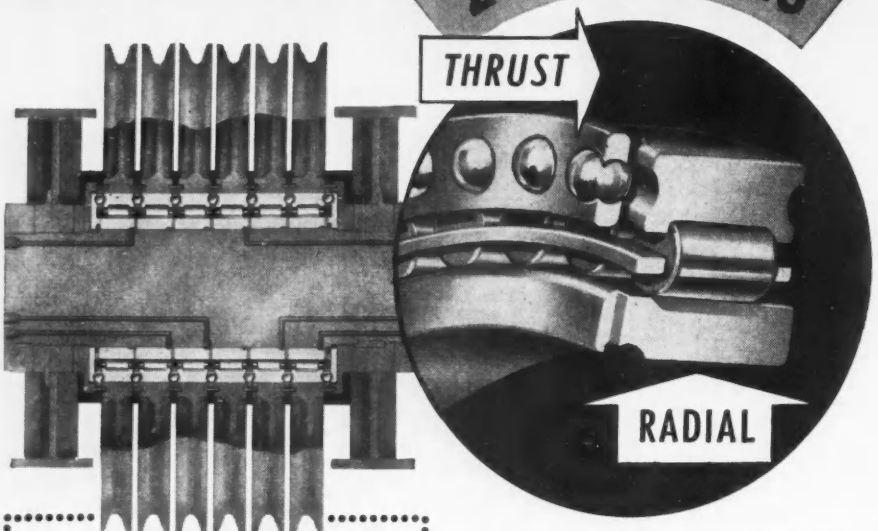
For additional information write for Bulletin P-1172, The Yale & Towne Manufacturing Company, Philadelphia division, 4531 Tacony Street, Philadelphia 15.



BEAUMONT CROWN AND TRAVELING BLOCKS

Provide **NEW SMOOTHNESS • Narrowness • RUGGEDNESS**

WITH THE HELP OF THIS *New* Aetna **2-WAY BEARING**



Application of Aetna's new, patented combination bearing in Beaumont's 6-sheave crown block.

Here's a bearing that does double duty in crown and traveling blocks—handles both radial and thrust loads as pure right angle loads—permits new block compactness that saves space, saves weight, saves money.

This new, patented combination cylindrical roller and ball thrust bearing is designed for use in blocks of any type, with any number of sheaves. Its 2-way, non-interfering load capacity attains lowest possible coefficient of friction, increases radial load capacity, lengthens bearing life, reduces risk of shut-downs, cuts maintenance and replacement costs to a new record low. Write for complete information on this and other Aetna oil country bearings.

AETNA BALL AND ROLLER BEARING COMPANY

4600 SCHUBERT AVENUE • CHICAGO 39, ILLINOIS

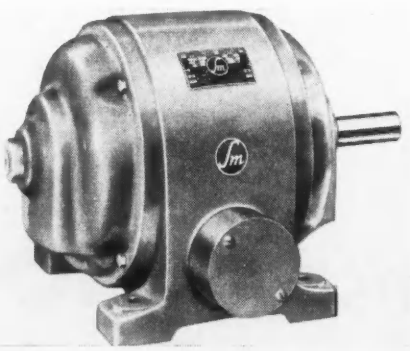
Aetna

STANDARD AND SPECIAL BALL THRUST BEARINGS • ANGULAR CONTACT BALL BEARINGS • SPECIAL ROLLER BEARINGS • BALL RETAINERS • HARDENED AND GROUND WASHERS • SLEEVES • BUSHINGS

222—Splash-Proof Motor

A new splash-proof motor for locations subject to direct streams of water and other liquids may be mounted in any position and keep its splash-proof features. End bells permit free passage of ventilating air through integrally-cast baffles, preventing splashing liquids from reaching the interior of the motor. Air is drawn through the rear of the motor and exhausted through the shaft end.

For additional information, write Sterling Electric Motors, Inc., 5401 Anaheim-Telegraph Road, Los Angeles 22.



FOR DRILLING TO 10,000 FEET with 4½" drill pipe

WHELAND

B-85 DRAWWORKS WITH CONSOLE CONTROL

Wheland rotary equipment to match the B-85 drawworks:

HP-14000 7½ x14 350 HP Slush Pump
A-20 . . . . 20½ inch Table Top Rotary
K-2500 . . . . 250 ton Traveling Block
E-6600 . . . 350,000 lb. cap. Swivel

COMPACT

FAST

QUIET

EASILY PORTABLE

RUGGED

PRESSURE FEED LUBRICATION

This New, Field Proven Wheland Drawworks Makes the Driller King of All He Surveys!

Never before has the driller had such easy and positive control over all drilling operations! With this new Wheland drawworks he can see the whole rig, control drilling operations accurately, quickly, easily.

4 Advantages of WHELAND CONSOLE CONTROL

1. EASY—All controls grouped at driller's fingertips.
2. SAFE—Console may be located in safest areas. Driller can easily see every part of the rig.
3. FAST—Controls respond instantly to a touch of the finger.
4. EFFICIENT—The weight carried on the bit and the speed of rotation are easily controlled.

This field proven Wheland drawworks with console control gives the driller control, visibility and safety never before available in drilling equipment. It is chock full of new performance and convenience features . . . For example: The feed-off characteristics of the Wheland air brake are similar to those of an automatic driller. Metering valve in air system allows minute adjustments in brake application. The rugged 750 HP transmission has forged steel shafts, forged steel, cut tooth, flame hardened sprockets and chain drives designed with a generous safety factor for smooth, trouble-free performance. Precision roller bearings throughout. Pressure feed lubrication . . . Get the whole story on this revolutionary new Wheland drawworks! Ask for free bulletin or

Ask your Jones & Laughlin Supply Man

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THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.
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Broad Street House
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DRAW WORKS • SLUSH PUMPS • ROTARIES • SWIVELS • CROWN BLOCKS • TRAVELING BLOCKS

223—Geological Guide

The "Geoguide" is a simple, comprehensive guide that gives oil men and geologists the names and geological ages of principal oil- and gas-producing formations in 11 of the major oil-producing states. The pocket-size guide is made of three sheets of Vinylite rigid plastic which is resistant to oil, grease and most other chemicals, and will not warp or shrink under prolonged use.

The information was compiled from more than 15 different sources by the Singer Calculator Company.

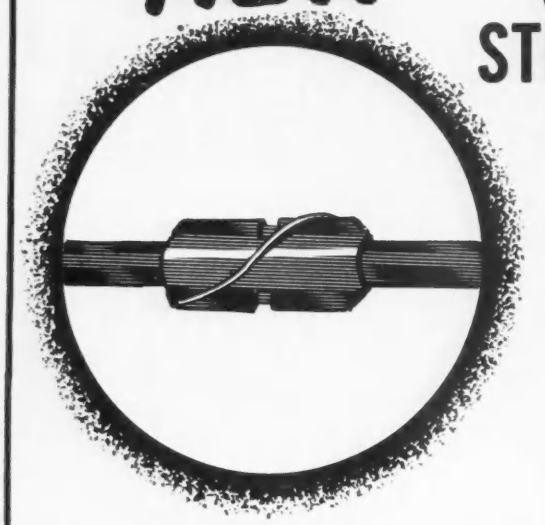
A "Geoguide" may be obtained by writing Johnston Oil Field Service Corporation, P. O. Box 165, Houston 1.

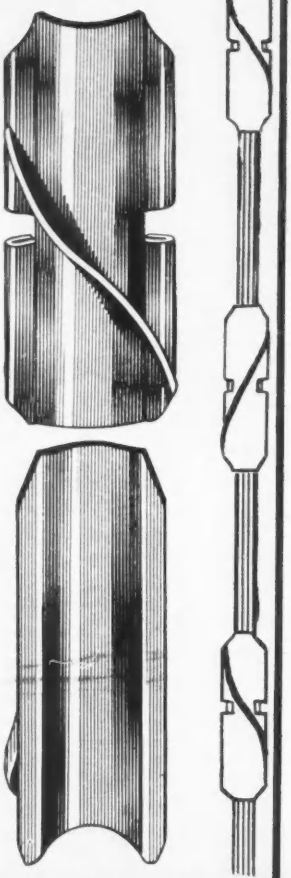
224—Coupling

Design features, specifications, working pressures and prices of All-Flex ball bearing swivel couplings are presented in a new catalog, No. 50.

For a copy of this catalog, write Gil-Lair Products, Inc., 81 Masonic Court Pasadena, Calif.

"THE NEW SCRAPER WITH THE STRONG-MAN GRIP"





Sunshine Iron Works has engineered a new advance in strength and wearability through heavier construction of the new M-25 Paraffin Scraper. The two sections of the S-I-W M-25 Scraper can be field installed with simple tools we manufacture for the purpose. The M-25 Scraper gets a snug grip on the rod (up to 5000 lbs., by test), and stays put while it shaves paraffin accumulations from tubing walls. Its two heavy steel blades, spiraled and welded around the shell halves, exert continuous unplugging effect in the hole as they curl off the paraffin with every stroke. Length of pumping stroke determines M-25 scraper spacing. Easy field installation, maximum resistance to wear, and long-operating dependability make the new M-25 S-I-W Paraffin Scraper a profit-saver!

Sunshine Iron Works

PHONE 4374
601 W. MURPHY
ODESSA, TEXAS

225—Drilling Data

A new pocket-size handbook contains drilling information, conversion factors, field tests, capacities of mud pits and tanks, sizes and capacities of casing and drill pipe, pump capacities, and relation between specific gravity, mud weights, and pressure head. Other data on muds are included in the 88-page booklet.

For a copy of this booklet, write Oil Base, Inc., 130 Oris Street, Compton, Calif.

226—Safety Head

A 16-page illustrated bulletin, "BS&B Safety Head Price List," explains sizes, ratings, specifications and prices of safety heads and accessories.

For a copy of this bulletin, write Black, Sivalls & Bryson, Inc., 720 Delaware, Kansas City 6, Mo.

227—Drilling Bits

Exploration drill bits in sizes from 1⅞ to 8 inches are described in a new illustrated 12-page catalog of Hawthorne replaceable blade bits.

For a copy of this catalog, write Herb J. Hawthorne, Inc., P. O. Box 7299, Houston 8.

228—Slush Pump Parts

Bulletin 357-A (which supersedes Bulletin 357) describes and illustrates Ideal fluid end parts for slush pumps, including valves and seats, fluid cylinder liners, fluid pistons, piston rods, cylinder liner packing, and piston rod packing.

For a copy of this bulletin, write The National Supply Company, P. O. Box 899A, Toledo, Ohio.

229—Plastic Pipe

A new stainless steel welding fittings price list, 52W, contains prices on a variety of fittings, such as elbows, return bends, stub ends, tees, etc.

For a copy of this price list, write The Cooper Alloy Foundry Company, Hillside 5, N. J.

230—Junk Snatcher

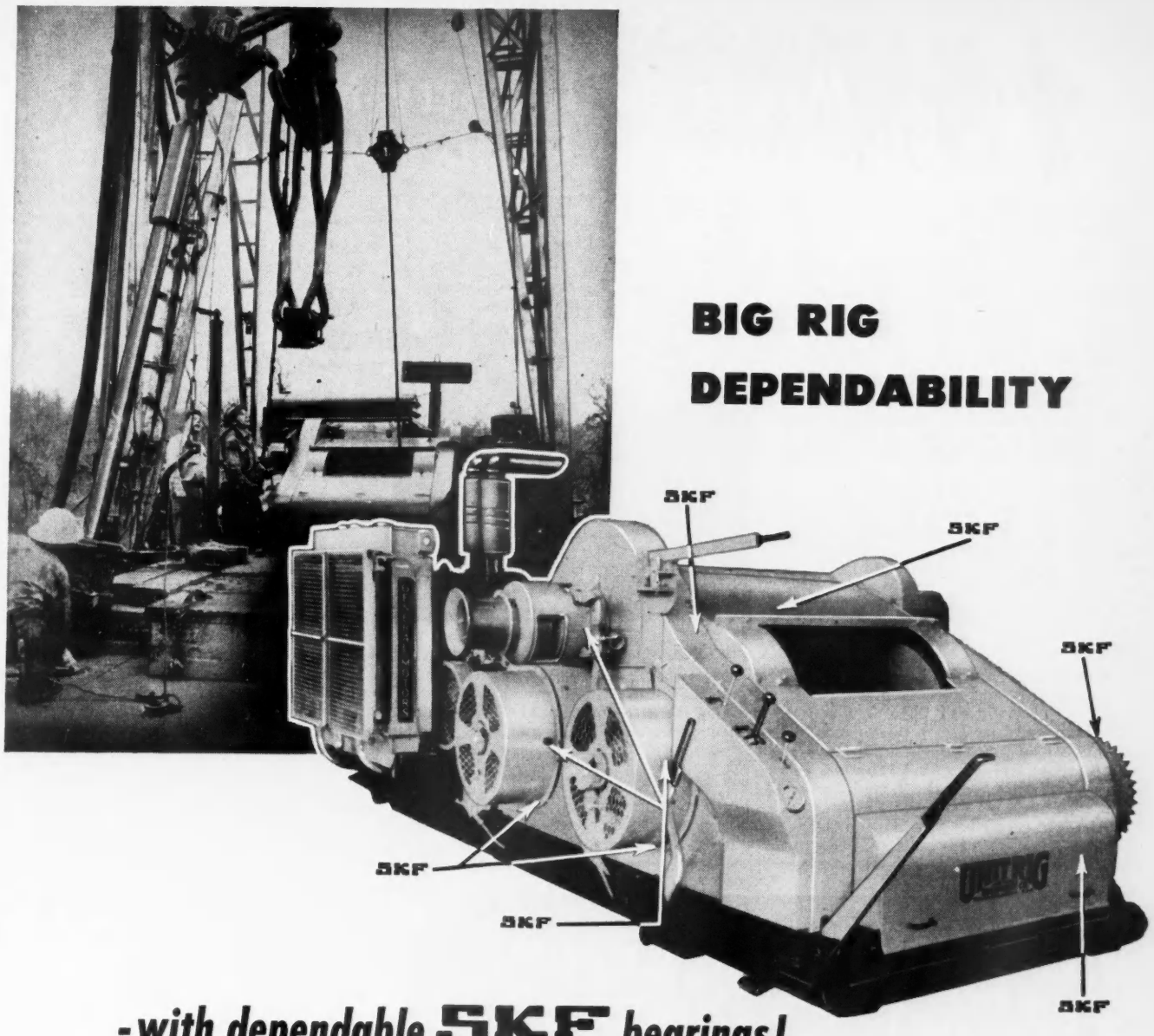
How to get junk out of the hole is illustrated and described in a new Globe Junk Snatcher folder.

For a copy of this folder, write Globe Oil Tools Company, Los Nietos, Calif.

231—Coatings

Samples of 28 different "Coro-Gard" anti-corrosion coatings for metal are included in a new folder.

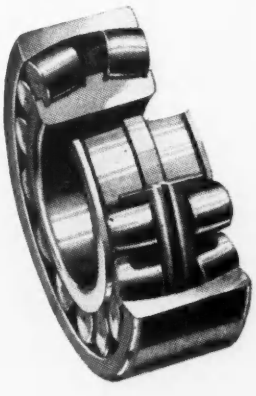
For a copy of this folder, write Minnesota Mining and Manufacturing Company, 900 Fauquier Street, St. Paul 6.



BIG RIG DEPENDABILITY

-with dependable SKF bearings!

Unit Rig & Equipment Company's Model U-34 single and double drum rotary drilling units are adaptable for drilling to 4,500 feet or servicing to 8,000 feet. They're adaptable . . . they're portable . . . easy to operate . . . and they have the dependability of big rigs. A *lot of that dependability comes from the use of SKF Bearings.* This unit uses SKF Spherical Roller Bearings, Single and Double Row Deep Groove Ball Bearings to keep friction at the minimum and to insure trouble-free operation. It's a sound selection . . . SKF has anticipated the needs of the Oil Industry, by helping to put the right bearing in the right place. Manufacturing standards are rigidly controlled . . . inspection is strict . . . uniformity constantly maintained. SKF Engineers will work with you in designing for maximum operating efficiency and economy. **SKF** INDUSTRIES, INC., PHILADELPHIA 32, PA., *the Pioneers of the Deep Groove Ball Bearing—Spherical Roller Bearing—Self-aligning Ball Bearing.* 7103



SKF

BALL AND ROLLER BEARINGS

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

Integrity — Craftsmanship — Metallurgy — Tolerance Control

Surface Finish — Product Uniformity — Engineering Service — Field Service

Men in the Industry NEWS

Don S. Camblin has been promoted from administrative assistant to assistant manager of Continental Oil Company's Industrial Relations department, and has been succeeded by **Max E. Stansbury,** formerly attorney in the Los Angeles office.

Camblin joined Continental as a clerk in the Purchasing department in 1926, and through successive promotions became superintendent of real estate and then refinery personnel advisor in 1942. He was made assistant director of service divisions in June, 1948.

Stansbury, a graduate of Oklahoma A. & M. College, joined the company as a clerk in the Land department in 1936, later was transferred to Centralia, Ill., and then entered the Army in 1942. He rejoined the company in March, 1947, as an attorney.

•

Dr. Grayson L. Kirk, provost of Columbia University, has been named to the board of directors of Socony-Vacuum Oil Company, Inc. He is the first board member from outside the company in the history of Socony-Vacuum. The other ten members of the board are full time employes.

Dr. Kirk recently was named a vice president of Columbia and will assume that office July 1 as principal assistant to President **Dwight D. Eisenhower.** An authority on government and international relations, Dr. Kirk has been a member of the Columbia faculty of political science since 1940 and holds the rank of professor of international relations.

For The Second Time in three years, Shell Pipe Line Corporation won first place in the personal injury safety contest for oil and gas pipe line companies sponsored by the National Safety Council. W. I. Kent, past general chairman of the petroleum section of the council, is shown presenting the first-place plaque to D. M. Farrell (second from right), head of the firm's safety and training program. T. E. Swigart, right, president of Shell Pipe Line, and H. H. Anderson, left, vice president and general manager, look on.

•

R. L. Fillner, former Grand Rapids, Mich., district production manager of The Ohio Oil Company, has been appointed division landman of the Casper, Wyo., division. Fillner joined the Billings Gas Company, a subsidiary of The Ohio, in 1922, and was placed on the scouting and leasing staff of The Ohio's Wyoming division in 1928. Transferred as a landman to the Findlay, Ohio, division in 1940, he was appointed acting division superintendent in 1945. With the consolidation of the company's eastern producing divisions in 1948, he was transferred to Grand Rapids as district manager.

•

R. C. Alden has been named chairman of the research planning board of Phillips Petroleum Company's research and development department, with **T. B. Hudson, W. A. Schulze** and **K. H. Hachmuth** as co-members. **P. M. Arnold** has been named assistant to **R. W. Thomas,** department manager; **R. L. Doan** replaces Alden as director of the research division and **T. W. Legatski** and **J. A. Reid** have been named assistant directors. Other research division changes include appointment of **F. W. Crawford,** assistant director, production and physics branch.

•

Wesley G. Gish has resigned as vice president in charge of land and exploration, Deep Rock Oil Corporation, to practice as a consultant geologist in Tulsa. He joined Deep Rock in 1946.

Behind: An eventful decade...

Ahead: Strength to meet the oil needs of free people

STANDARD OIL COMPANY (NEW JERSEY) REPORTS FOR 1949...

THE 215,000 STOCKHOLDERS of Standard Oil Company (New Jersey) have just been sent the Company's 1949 Annual Report. Some highlights are given here.

The report covers the closing year of an eventful decade—a decade of violent action and change... of war, and war's results, of great shifts in people's living standards, and in their hopes and aims.

It was a decade which put the strength and adaptability of American business to great tests. *And proved that the American kind of business enterprise gets jobs done.*

To the oil business, these last ten years brought demands far beyond any past experience.

Standard Oil Company (New Jersey) carried well its full share of this load. More new supplies of oil were found and developed than ever before. With them came more new processes, more new products, more new jobs and job opportunities. We took in more money, and paid out more—for wages, taxes, dividends, supplies—than in any previous decade in history. And in that ten years almost four times the amount paid in dividends was invested in new facilities—strengthening the business to meet war and post-war needs.

Like all sound American business, Jersey Standard got these results through skill, initiative, teamwork and the productive use of capital. Men who work in the business of their choice—free to think and make decisions—took actions which got results and got them in time.

In reporting for 1949, this Company offers its stockholders not just the report of one business year... With it comes the hopeful assurance of strength and ability to meet the growing oil needs of free people in free lands.

HIGHLIGHTS FROM THE 1949 REPORT:

(for the consolidated companies)

PRODUCTION—957,000 barrels daily total (11% less than 1948)

REFINING—1,287,000 barrels daily total (7% less than 1948)

SALES—1,363,000 barrels daily (slightly less than 1948)

RESEARCH—$21,400,000 spent on scientific projects (6 per cent more than in 1948)

CONSOLIDATED NET EARNINGS—$268,870,000 or $8.91 a share. This compares with $365,605,000 or $12.44 a share in 1948. Total income $2,934,686,000 (12 per cent less than 1948)

PARENT COMPANY NET EARNINGS—(from which shareholders' dividends are paid) $171,707,000 or $5.69 a share. This compares with $155,923,000 or $5.31 a share in 1948.

DIVIDENDS—$4.00 a share plus one share for each 50 shares held.

EMPLOYEE RELATIONS—Again no work interruption due to labor difficulties.

• • •

Copies of the full report will be gladly sent to anyone wishing full details. Write Room 1626, 30 Rockefeller Plaza, New York 20, New York.

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

William R. Boyd, Jr., Teague, Texas, **Major B. A. Hardey,** Shreveport, and **R. L. Wheelock,** Corsicana, Texas, have formed the firm of Boyd, Hardey & Wheelock, to conduct activities and operations "limited to the initiation and conduct of negotiations for the purchase or sale of oil or gas producing properties, and for the merger of oil or gas companies or individually owned oil or gas interests." Headquarters will be at Teague, and Boyd will be the managing partner.

Boyd is a consulting attorney and petroleum consultant-advisor. For 29 years he was an official of the API, and served as president for eight years before his resignation in November, 1949. Hardey and Wheelock are both independent producers of oil and gas.

•

E. M. Jacobs has been appointed assistant department agent, Houston Accounting department, The Texas Company. Jacobs was first employed by The Texas Company in 1920 as a clerk in the Houston Accounting office. In 1922 he was transferred to Cisco, Texas, and in 1929 was transferred to the Los Angeles office and promoted to chief clerk. He was made division accountant in 1943, and served in that position until his present appointment.

Ira O. Walker

Perry J. Sweeny

Perry J. Sweeny, Texas City, Texas, has been elected chairman of the board of Pan American Pipe Line Company. **Ira O. Walker,** Houston, was elected president.

A graduate of the University of Illinois, Sweeny joined Standard Oil Company of Indiana in 1916 as a draftsman. In 1933 he moved to Texas as plant manager of Pan American Refining Corporation's Texas City refinery. Before his present position, he was first vice president of the refining firm.

Walker has had a varied oil career since he became a roustabout in Wyoming in 1921. He had extensive experience in Venezuela, including service as division superintendent over the Lake Maracaibo fields for Lago Petroleum Corporation. He was production foreman of Shell Oil Company's Black Bayou field in South Louisiana in 1935, and in 1936 joined Pan American Production Company. He became district superintendent in 1937, in charge of the Port Barre, Sorrento, LaPlace and Valentine fields. He joined Pan American Gas Company in 1943 as division superintendent of the South Gillock field in Galveston County, Texas. A year later he became general superintendent of Pan American Pipe Line Company, and in 1947 was promoted to vice president and general manager.

•

Donovan P. Dugan has been elected vice president of Tuscarora Oil Company, Ltd., Harrisburg, Penn. With the company since 1931, Dugan started on field work in New Jersey, and was transferred in 1935 to the Engineering department at Harrisburg. In 1944 he was appointed assistant superintendent, and in 1947 was made superintendent and a manager.

•

Robert G. Mills, former party chief for United Geophysical Company in Canada, has accepted a position as seismologist with British-American Oil Company in Canada.

•

A. P. (Tex) Clark, Jr., has resigned from Forest Oil Company, Nowata, Okla., to become a waterflood consultant at 2206 Avenue D, Wichita Falls, Texas.

•

E. Dunlap, Jr., E. V. Dunlap, and **E. Dunlap** have organized the Triplee Oil Company, with headquarters at Ardmore, Okla.

the starting point to MAXIMUM INFORMATION!

Whether wire line, conventional or sidewall core, UNITED CORE can give you the basic analysis data with extensive experience in the interpretation of that data.

If you core, no matter what type, let us evaluate that core for you. Why spend the money for cores and not, for a fraction of that cost, have them analyzed and evaluated?

SCOPE OF UNITED CORE'S SERVICE EXTENDS TO YOUR DEMANDS . . .

Well Site Core analysis. Have your core analysis data with you as you core.

Frozen Cores. When time permits cores can be preserved for weeks, if necessary, by freezing and still have their original core barrel freshness.

Off-Location analysis. Cores preserved for analysis in the near future. Interpretation is made also on this type of analysis.

Sidewall Core analysis. Maximum information and interpretations on all **precussion type** sidewall cores.

Remember — CORE ANALYSIS IS YOUR MOST ECONOMICAL POSITIVE INFORMATION . . .

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PETROLEUM RESERVOIR ENGINEERING

3617 South Main Street ★ **Houston 6, Texas**

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AND THE GOING'S ROUGH ...

ANYWHERE SERVICE ANYTIME
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RED SEAL CONTINENTAL
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HOUSTON - DALLAS - CORPUS CHRISTI
McALLEN - LUBBOCK - WICHITA FALLS

You can always depend upon STEWART & STEVENSON Service

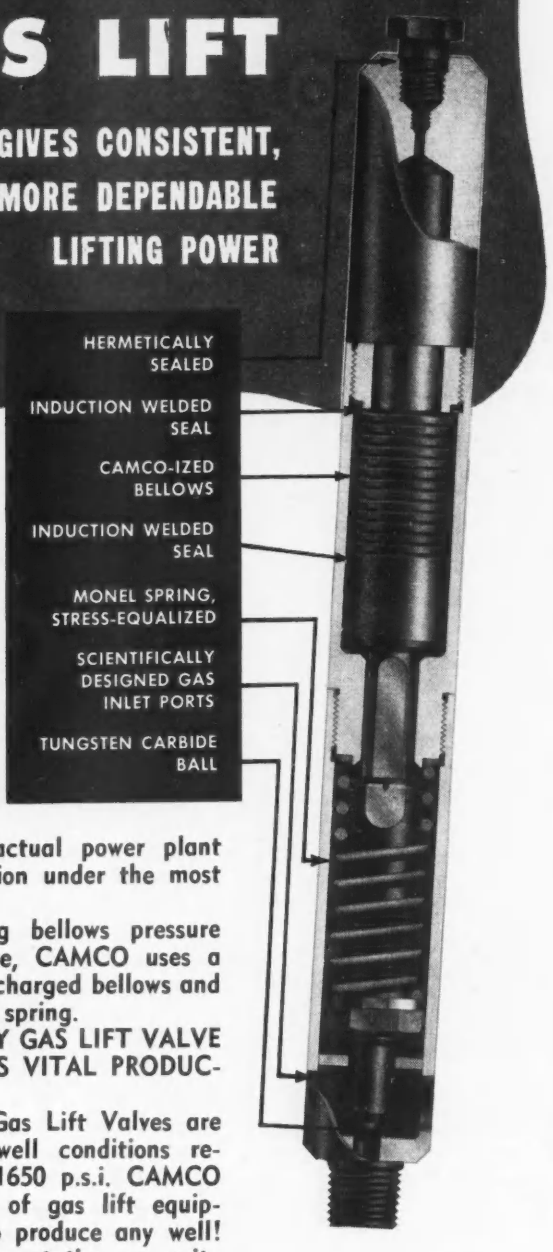
Stewart & Stevenson's factory-trained mechanics are always ready for your service call, ready *anytime* — night or day — regardless of where you may be . . . or what the circumstances. They drive fast panel trucks—fully equipped with all the necessary parts and tools to get your engine back on the line *in the shortest possible time.*

2060

CAMCO

GAS LIFT

CAMCO-IZING GIVES CONSISTENT, MORE DEPENDABLE LIFTING POWER



CAMCO-IZING . . . an exclusive CAMCO process . . . is the only answer to consistent, dependable lifting power and economical gas-fluid ratios available in gas lift equipment today.

CAMCO-IZING preforms the valve bellows with 5,000 lbs. differential pressure. Thus, it tests while it conditions the valve's actual power plant for correct, positive action under the most severe well conditions.

And instead of using bellows pressure alone to close the valve, CAMCO uses a combination of pressure-charged bellows and a stress-equalized monel spring.

CAMCO IS THE ONLY GAS LIFT VALVE WHICH PROVIDES THIS VITAL PRODUCTION INSURANCE.

Hundreds of Camco Gas Lift Valves are installed today under well conditions requiring from 125 thru 1650 p.s.i. CAMCO makes a complete line of gas lift equipment . . . equipment to produce any well! Ask your Camco Representative or write Camco, Inc., 7315 Canal St., Houston, for help with your production problems.

Your copy of the new Camco Catalog is now ready. Write for it today

CAMCO

GAS LIFT EQUIPMENT AND SERVICE

MEN IN THE INDUSTRY NEWS

Wallace E. Pratt, one of the leading petroleum geologists of the present generation, was awarded Columbia University's Kemp Medal for "distinguished service in geology." The award was presented by Columbia President **Dwight D. Eisenhower.** Pratt was introduced by **Eugene Holman,** president of Standard Oil Company (N. J.), with which Pratt was associated before his retirement in 1945.

Wallace E. Pratt

Graduated from the University of Kansas in 1907, in 1909 Pratt went to the Far East as geologist for the Division of Mines, government of the Philippine Islands, and three years later was made chief of the division. Returning to the U. S. in 1916, he was associated first with The Texas Company and later, for many years, with Humble Oil & Refining Company. Joining Jersey Standard in 1937, he became a director and member of the executive committee, and in 1942 was elected a vice president.

•

Arthur A. (Duke) Curtice was elected president of Conorado Petroleum Corporation. Other officers are **Christian F. Dohm,** vice president; **Rawleigh Warner, Jr.,** treasurer and assistant secretary; and **Bettye M. Bohanon,** secretary and assistant treasurer.

•

William H. Curry, head of the Far West Oil Company, has established company offices at Casper, Wyo.

•

Daniel D. (Jack) Adams has been appointed zone agent for Gulf Oil Corporation at Oklahoma City, succeeding the late **M. V. (Bus) Rushmore. C. B. Dugger** in the Oklahoma City Land department, will assume some of the duties formerly handled by Adams.

•

Kate C. Ornsen has joined Sun Oil Company's Research and Development department staff as technical librarian. She succeeds **Leila K. Henderson,** resigned. Miss Ornsen was formerly with Monsanto Chemical Company in Dayton, Ohio.

•

Norman R. McKee, vice president of Southern Counties Gas Company of California, has retired after 35 years with the company. He had been in the gas and oil business in Los Angeles for 47 years.

•

Edwin B. Cox and **Jake L. Hamon** have dissolved the Cox and Hamon partnership and will operate independently in Dallas. Edwin B. and **Edwin L. Cox** will remain in the Magnolia Building, and Hamon will maintain headquarters in the First National Bank Building.

Aiming for higher octanes?

See how THIS Mercaptan Removal Process replaces doctor treating AND

- *reduces TEL requirements*
- *gives you low operating costs*
- *requires a minimum of new equipment*

More than seven years of commercial refinery operation have proved conclusively the high efficiency of the Tannin Solutizer Process* for mercaptan removal. This is the process that brings your equipment up to "new plant" standards in the economical treatment and blending of higher octane gasolines, *without* affecting the stability of the treated product.

Converting to the Tannin Solutizer Process requires a minimum investment in new equipment . . . very likely your present equipment will serve with little change.

Operating economy is an outstanding advantage of the Tannin Solutizer Process. Still another important consideration . . . *this process is not corrosive;* does *not* require equipment of special alloys.

Complete engineering service is available . . . to help plan your unit, to supervise start-up, to assist in later operation if required. We welcome the opportunity to work with you in achieving the many benefits of the Tannin Solutizer Process.

**The Tannin Solutizer Process is licensed under the patent rights of Socony-Vacuum Oil Company and Shell Development Company.*

SHELL DEVELOPMENT COMPANY
50 West 50th Street, New York 20, New York

SHELL

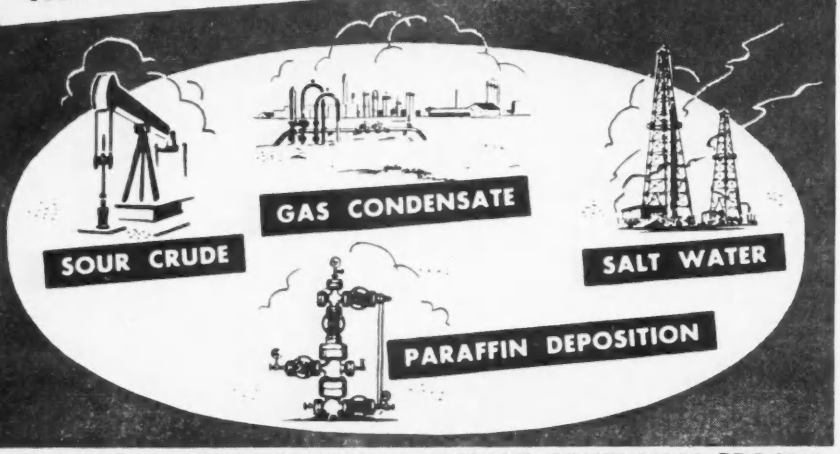
NOW OVER

3½ MILLION

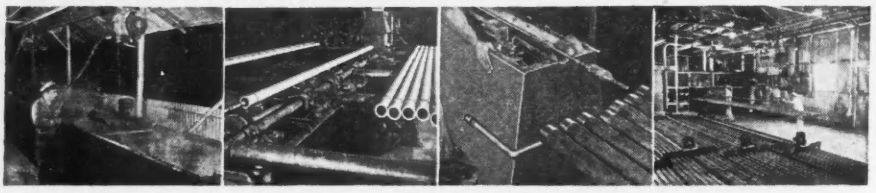
FEET OF OILFIELD PIPE HAS BEEN 'TUBE-KOTED'

for use in domestic and foreign fields!

FIGHTING CORROSION BY PROTECTING THE SURFACE!



SUPERIORITY MARKS THE TUBE-KOTE PLANT-CONTROLLED PROCESS



THOROUGH CLEANING IN SUCCESSIVE CHEMICAL TANKS

SANDBLASTING TO BASE METAL

AUTOMATIC COATING FOR PERFECT UNIFORMITY

CONTROLLED BAKING IN MANY LAYERS

All of these steps plus rigid inspection between each operation assures highest quality workmanship.

TUBE-KOTE

TUBE-KOTE

First Name In Corrosion Resistance

2520 HOLMES ROAD . . . P. O. BOX 8123, HOUSTON, TEXAS

WIRE, PHONE OR WRITE FOR TUBE-KOTE TECHNICAL SERVICE BULLETIN

The 1950 Achievement Award of the New York Personnel Management Association was presented to James Tanham, right, vice president in charge of industrial and public relations of The Texas Company, by John H. Holzbog, left, chairman of the association. The award is made annually for outstanding contributions to the field of personnel administration.

James V. Boxell, for 13 years with Republic Supply Company in the Illinois Basin and division manager for the past six years at Salem, Ill., has joined Calvert Drilling, Inc., Olney, Ill.

•

C. W. Evelyn, Jr., has been appointed district superintendent of the newly created Northwestern district of the British-American Oil Producing Company's Production and Engineering Department at Casper, Wyo. The office will have supervision of all operations of the department in Montana, Colorado, Wyoming and Nebraska. Other personnel include **H. C. Gleason,** district engineer, and **Jay Sanderson,** district clerk. **M. T. Johnston,** Riverton, Wyo., is field superintendent of Steamboat and Pilot Butte fields, and **W. A. Day,** Cut Bank, Mont., is field foreman of the Cut Bank field.

C. W. Evelyn, Jr.

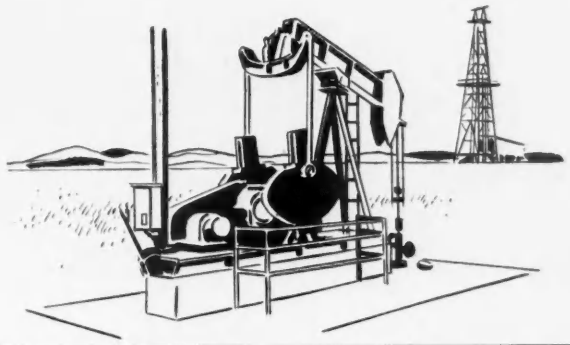
Evelyn, a graduate of the University of Arkansas, received his early oil field experience with Crescent Drilling Company and was petroleum engineer for Halliburton Oil Well Cementing Company at Duncan, Okla. He served in the Army Air Corps, and after the war joined Frontier Drilling Company in Denver. He joined British-American in June, 1948, in the Wyoming district.

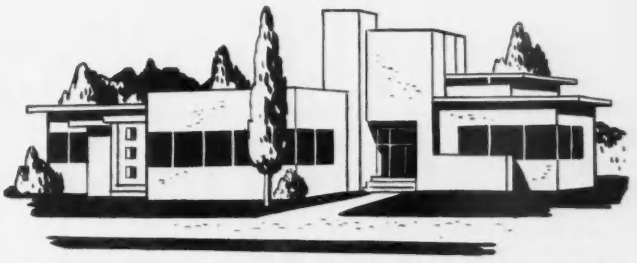
•

A. L. Springfield has been named acting manager of Deep Rock Oil Corporation's Personnel and Industrial Relations division, temporarily replacing **J. H. Westbrook,** who is assisting **B. L. Majewski,** vice president, in making organizational studies of Deep Rock's marketing division.

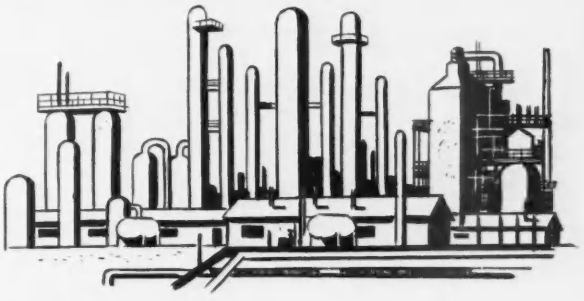
THROUGHOUT THE OIL INDUSTRY

the trend is to *Electric!*

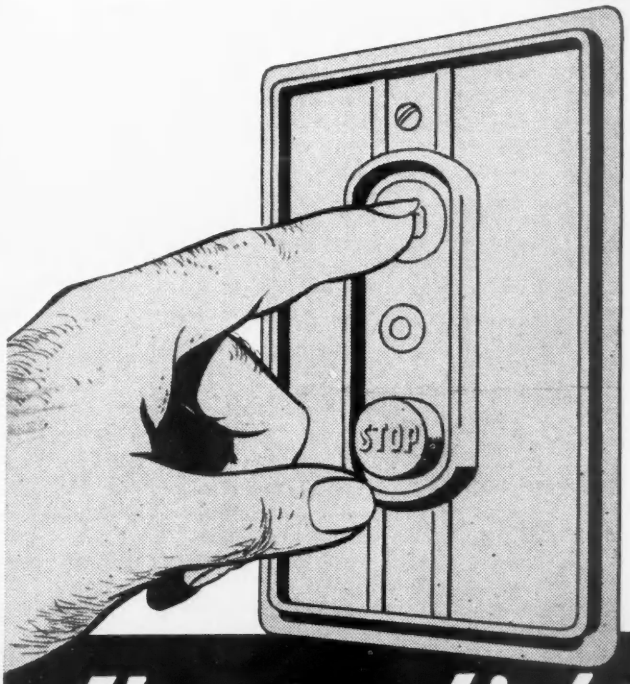




- In Production
- In Pipe Line Pumping
- In Refining



BECAUSE



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Houston Lighting & Power Company engineers will gladly discuss your requirements for field or refinery.

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Roger L. Messman, assistant division geologist for Continental Oil Company, Ponca City, Okla., has resigned to become associated with **William Graham,** Wichita independent operator. They will do exploration and development, initially in Kansas and Oklahoma.

Messman joined Continental in 1936 at Ponca City, and has done geological work in Oklahoma and Kansas for the past eight years.

•

E. W. Masters, Pacific Coast production manager for Shell Oil Company, was in charge of a meeting in Los Angeles of the company's top production men from every major oil producing area in the U. S.

•

Floyd Green, Oklahoma City, has resigned as conservation attorney for the Oklahoma Corporation Commission to enter private practice. He has served as conservation attorney since July 1, 1939.

•

A. E. Halverson, for 16 years a director of Imperial Oil, Ltd., has retired after 37 years with the company.

LIQUID PLASTIC VINYLITE Protective Coating

Protect Offshore Equipment With "Liquid Plastic"

"LIQUID PLASTIC" for corrosion prevention and for anti-fouling has been proved a superior protective coating. It is in use by major companies on such equipment as wellheads and all offshore equipment exposed to weathering and salt water corrosive action.

In anti-fouling it prevents barnacles and marine growth and protects against severest conditions wherever applied.

It is adaptable to machinery and related equipment, pipe systems, and connection units.

It is easy to apply and increases protection many times more than conventional coatings. It saves money in maintenance, time, and labor.

"Liquid Plastic" is being used in combatting paraffin build-up in tubing and lead lines. Use of coated pipe greatly reduces maintenance cost of paraffin removal.

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D. S. Skinner

R. R. Martin

D. S. Skinner, formerly superintendent of the Rocky Mountain district of Continental Oil Company's Pipe Line department, with headquarters at Lance Creek, Wyo., has become superintendent of the Oklahoma-Kansas district, with headquarters in Ponca City, Okla.

R. R. Martin, who has been employed as district clerk in the Rocky Mountain district at Lance Creek for more than ten years, has been promoted to superintendent, succeeding Skinner.

Skinner attended the University of Kentucky and joined Continental Oil Company in 1931, assigned to field work in the Oklahoma-Kansas district. He was district gauger in the same district in 1942 when he was promoted to district foreman at Corpus Christi. He returned to the Oklahoma-Kansas district late in the same year as chief gauger and became district foreman of the district in 1943. He went to Lance Creek as district superintendent in 1944.

Martin attended the University of Oklahoma and went to work for Continental in 1937 as a clerk in Ponca City. He became a clerk in the Rocky Mountain district at Lance Creek in 1939 and was promoted to district clerk in 1940. He served in the Army from 1941-1945 and returned to Continental as district clerk at Lance Creek.

•

J. J. Arps, British-American Oil Producing Company, and **H. O. Harder,** Sunray Oil Corporation, Tulsa, have been made honorary members of Pi Epsilon Tau, Tulsa University petroleum engineering fraternity.

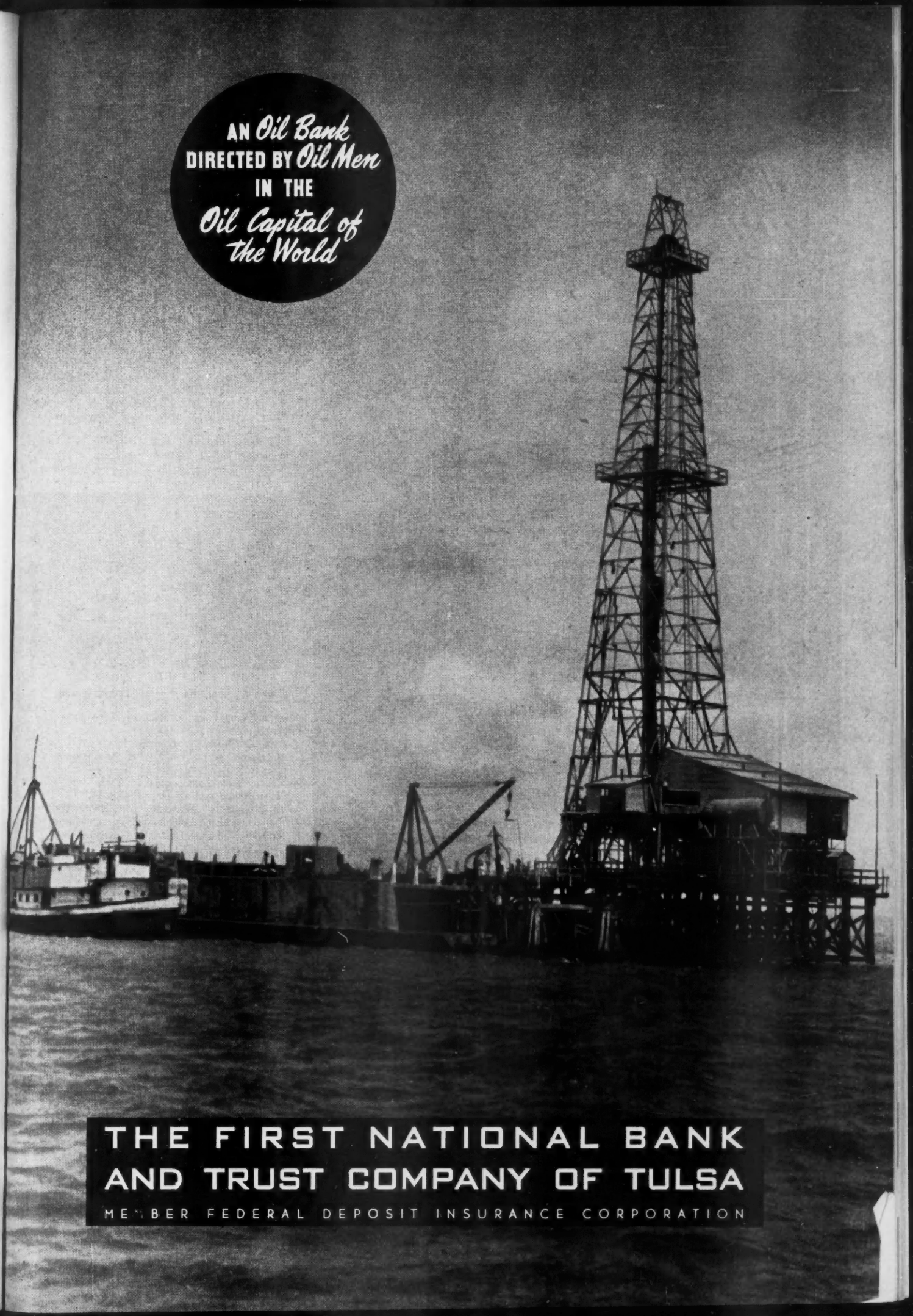
•

Norval W. Nichols has been elected a director and appointed vice president of Great Plains Development Company of Canada, Ltd. He will be in charge of the Calgary, Alberta, office, where the field operations staff will be established under his supervision.

Nichols, a graduate of Yale University in geology, was with The Superior Oil Company of California during the past 12 years in Texas, New Zealand and Canada. During the past seven years he was with the Canadian operating subsidiary, Rio Bravo Oil Company, as vice president in charge of exploration.

•

George H. Fentress has resigned from Phillips Petroleum Company and has accepted a position as geologist with Lion Oil Company at Jackson, Miss.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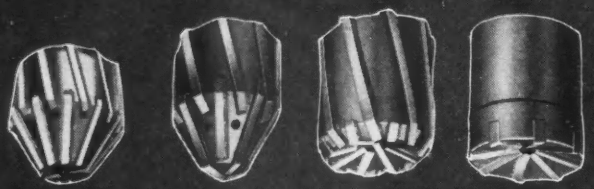
Leading oil operators the world over use Kinzbach Whipstocks for side-tracking, straightening and directional drilling operations. They can be set at any depth, requiring no support for the bottom. Positive setting slips prevent slipping or turning in hole. They can be oriented to mill out in any direction. Patented hinge arrangement assures that top of Whipstock will lie close against pipe walls at all times, permitting easy passage of drilling tools. Setting trigger always locates whipstock between couplings so window will be within one joint. Available in all popular sizes of casing.



Type "A" Mill Type "D" Mill Type "H" Mill Type "I" Mill

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MEN IN THE INDUSTRY NEWS

D. W. McGibbon

Trevor Moore

Trevor Moore, Toronto, has been elected a director of Imperial Oil, Ltd. **D. W. McGibbon** was appointed treasurer, **John W. Hamilton** was named general counsel, and **M. L. Haider,** a director since 1948, was appointed a vice president.

Moore, formerly a director and vice president of the firm McLeod, Young, Weir & Company, Ltd., has had a broad

John W. Hamilton

M. L. Haider

background in financial operations and corporate financing.

McGibbon, who has been with the company since 1932, was previously assistant to the treasurer.

Formerly a counsel with Imperial, Hamilton joined the company in 1938 as assistant solicitor, and returned to the company after six years' service with the Royal Canadian Navy.

A graduate of Stanford University, Haider was in the Producing department of Standard Oil Company (N. J.) before he joined Imperial as general manager of its Producing department.

•

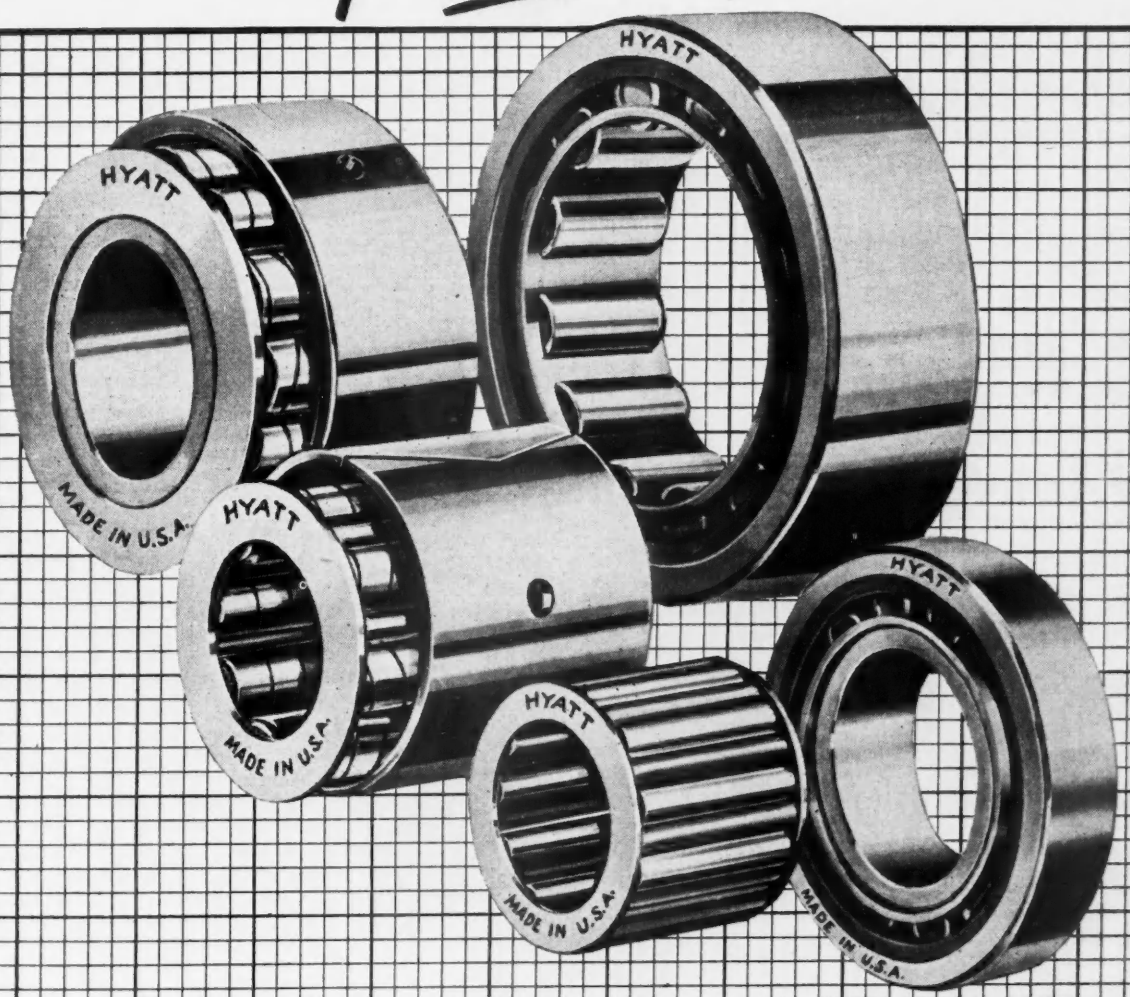
O. C. Mudd, Houston, senior corrosion engineer for Shell Pipe Line Corporation, was awarded the F. N. Speller Engineering Award for 1950 from the National Association of Corrosion Engineers. The honor was presented in recognition of Mudd's contributions to the development of a method by which corrosion surveys along pipe lines can be conducted without contacting the buried pipe.

Mudd, who attended Montana State College, joined Shell in 1929 at Wood River, Ill., and joined Shell Pipe Line in 1933. He is the author of the technical handbook, "Control of Pipe Line Corrosion."

•

Kenneth L. Smith, formerly an engineer with Stanolind Oil & Gas Company, has been named chief production engineer for Champlin Refining Company, Enid, Okla. Smith is a graduate of Wooster College and the University of Pittsburgh.

HYATTS *pay off* in performance



Hyatt Roller Bearings are purposely designed and built *first* to *last.*

And in every application, Hyatts have proved their correct design and built-in quality by their profitable performance in endless types of machines and equipment.

Profitable to the user because of their long-life, ease of maintenance, economy in lubrication and freedom from idle time. Wherever Hyatts are used and for more than half a century in all kinds of applications, it has been proved that Hyatts pay off in performance. Hyatt Bearings, Division, General Motors Corporation, Harrison, New Jersey-

HYATT ROLLER BEARINGS

DEATHS

C. O. Long, 52, sales representative for The Guiberson Corporation in West Texas, died in San Antonio May 3. Long was a drilling superintendent operating in the West Texas area before he joined Guiberson in May, 1944. A native of Tennessee, his home was in Odessa, Texas.

C. O. Long

•

Earle T. Berryhill, 47, Oklahoma independent oil operator, died May 4 at Sapulpa, Okla.

Howard Ellsworth Cole, 77, former vice president and a director of Standard Oil Company of New York who retired in 1930, died April 27 in New York. Cole became associated with Standard Oil Company of Cleveland as a young man, as assistant to the vice president and then general manager of Waters-Pierce Oil Company, Mexico. He returned to New York in 1907, and was later made general manager of Japan and Korea. In 1914 he returned to the U. S. and was made a director of Standard Oil of New York. He became a vice president in 1924 and was a director and vice president until his retirement.

Hobert E. Fugate, 53, district production foreman for Tide Water Associated Oil Company, died April 21 in Kilgore, Texas. He had been with the company more than 23 years.

•

Seymour J. Dean, 62, chief engineer in the Seminole, Okla., area for Phillips Petroleum Company, died April 20 in Oklahoma City. He had been chief engineer for the past 22 years.

•

Raymond A. Weber, 55, sales representative in the Hutchinson, Kansas, area for Jones & Laughlin Supply Company, died May 12 at Hutchinson. He was a former Bovaird Supply Company representative.

•

James E. Pennybacker, 51, chairman of the Petroleum Advisory Group at the headquarters of the Supreme Commander, Allied Powers in Tokyo, Japan, and for 25 years a Far East executive for Standard-Vacuum Oil Company, died April 21 in Tokyo.

•

Albert H. Kasishke, 57, president of Alkay Oil Company, died April 28 in Tulsa. He organized the Coralena Oil Company which was acquired several years ago by Co-Operative Refining Company of Kansas.

•

James Earl Thompson, 67, farm boss with Amerada Petroleum Corporation at Forsan, Texas, died April 18. He had been in the oil business since 1902 and with Amerada since 1928.

•

Edward W. Stephens, 51, manager of belting sales for The Goodyear Tire and Rubber Company, died May 8 in Akron, Ohio. Stephens was credited with the design of several large conveyor belt systems used to haul materials for dam construction projects.

•

O. L. Harmon, 70, retired Oklahoma oil man, died May 3 in Tulsa.

•

Frank N. Sheehan, 61, Tulsa, for the past 20 years affiliated with Sheehan Pipe Line Construction Company, died April 29 in Vincennes, Ind. A Tulsan since 1915, he was formerly associated with Prairie Pipe Line Company.

•

E. P. Edwards, 60, Tulsa independent oil operator, died April 28.

•

James Managan, 84, retired employe of The Texas Company, died April 30 in Tulsa. He had been with the company 30 years before he retired in 1939.

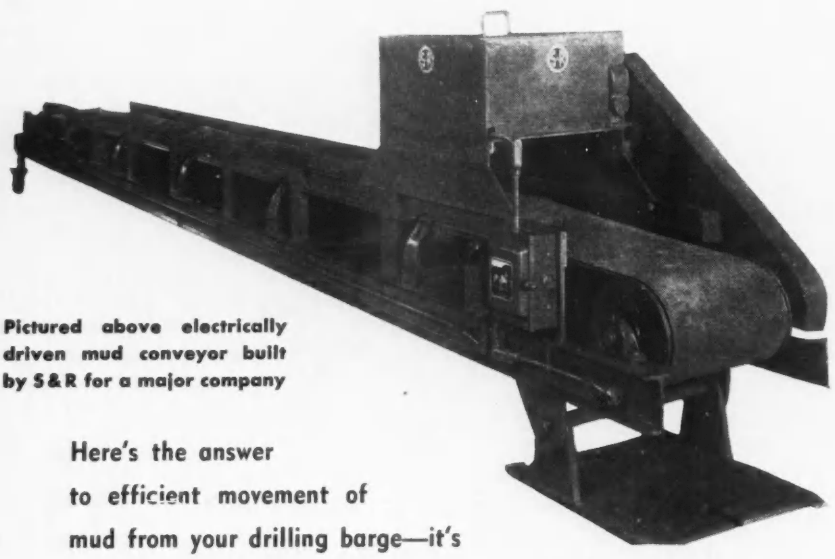
•

Harry Kirschner, 75, pioneer Oklahoma oil operator, died April 18 in Muskogee, Okla. He immigrated from Poland in 1891 and had resided in Muskogee since 1905.

•

Frank Gillett, 62, owner of Gillett Supply Company, Tulsa, died April 19.

S & R Special *Custom Built*
Mud Conveyors for Drilling Barges



Pictured above electrically driven mud conveyor built by S & R for a major company

Here's the answer to efficient movement of mud from your drilling barge—it's S & R's custom built, electrically powered, chain drive mud conveyor.

Built for heavy duty service with quality materials equipped with reversible belt, troughing idlers, protected easily accessible drive housing. Operates efficiently all positions to 35° off horizontal. Built in sizes to 40 feet.

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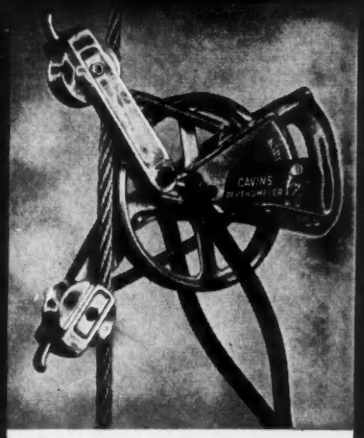
Easy to use

Light and handy to carry

No more "Stringing-in" Guess Work



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Hundreds of Cavins Depthometers are in successful service giving their owners direct-reading, accurate well measurements. This strong, simple device comes in a handy carrying case (weighs only 17 pounds)—is put on the line in a few seconds, and tells you where bottom is quickly and dependably. —Write for folder to The Cavins Co., 2853 Cherry Ave., Long Beach 6, California.

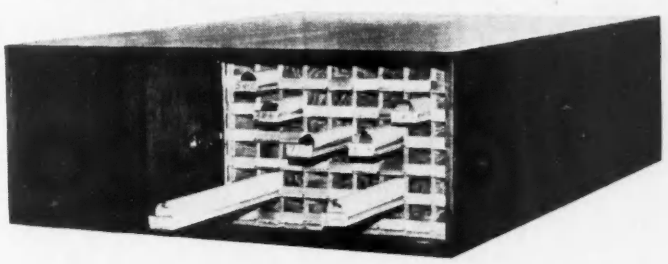
THE CAVINS DEPTHOMETER

Announcing New

Sectional MAP CABINET

Especially designed for large map storage space

ULTRA ATTRACTIVE: Worthy as a companion to any furniture in the most deluxe office.



INSTANT ADJUSTMENT: For any length maps or tracings from 12" to 54" long. Each well 2" x 2" square, is equipped with individual wood slide for map adjustment and index.

SUBSTANTIAL LOCK: Individually keyed.

6 Inch Base on Bottom Section, $12.50

Overall Dimensions—And Prices

CAPACITY	WIDTH	HEIGHT	DEPTH	PRICE
216"	45 5/8"	29 1/4"	58 3/4"	$265.00
108"	45 5/8"	15 7/8"	58 3/4"	165.00

Above model cabinets accommodate 54-inch maps.

CAPACITY	WIDTH	HEIGHT	DEPTH	PRICE
216"	45 5/8"	29 1/4"	47"	$242.50
108"	45 5/8"	15 7/8"	47"	140.25

Above models accommodate 42-inch maps.

Exterior of cabinets are made of 3/4" five ply beautiful grained hardwood, with mitered locked joints and sliding doors locked on sides. Interior partitions 1/2" thick, and 1/4" slides, all three ply veneer of southern hardwood or fir.

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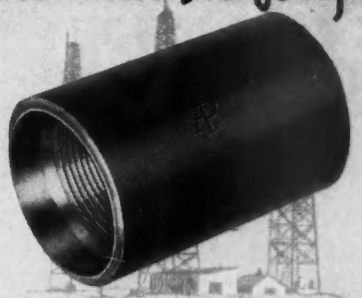

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Be Sure to Check

The Trading Post

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Associations

Rocky Mountain Section Officers of the API's Division of Production, elected at the spring meeting, are, left to right, Zach K. Brinkerhoff, Jr., Casper, Wyo., chairman of the advisory committee and outgoing chairman; C. H. Griffin, Casper, vice chairman at large; A. E. Campbell, Casper, secretary-treasurer; C. L. Larson, Jr., Casper, chairman; W. P. Tallant, Denver, vice chairman for Wyoming; and D. T. Hoenshell, Casper, vice chairman at large. Rex Davis, Cut Bank, Mont., vice chairman for Montana, is not shown.

Equipment Suppliers Society Changes Date for 1950 Meeting

A change in the dates for the 15th Annual Membership Meeting of the Petroleum Equipment Suppliers' Association was announced by President Guy A. Tompson, who said that the meeting is now set for June 25-27 at the Greenbrier Hotel, White Sulphur Springs, W. Va.

Reservations are being received by Walter Pusch, supervisor of the Pacific district.

With the average depth of oil producing wells gradually being increased, modernization of equipment is being made to effect economy, precision, safety and time. The old "Merry Go Round" tubing tongs and rod wrenches are rapidly becoming obsolete in the deeper fields and are being replaced by air or pneumatic tongs. And the deeper the hole, the greater the need.

When called upon to design an air compressor unit for this purpose, using pneumatic tubing tongs with torque indicators, installation space being confined to a width of 22 inches, due to state regulation of 8 ft. max. truck-bed width, Harley Sales Co. chose a Model VF-4 20 hp. Wisconsin Heavy Duty Air-Cooled Engine with clutch-reduction assembly, direct-connected to a two-stage compressor . . . the first direct-connected job of this type used in the oil field, so far as known. This Wisconsin-Powered compressor unit is now working in West Texas and giving excellent results, according to reports.

For any oil field power job within a 3 to 30 hp. range, you can't do better than to specify "Wisconsin Air-Cooled Heavy Duty Engines."

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

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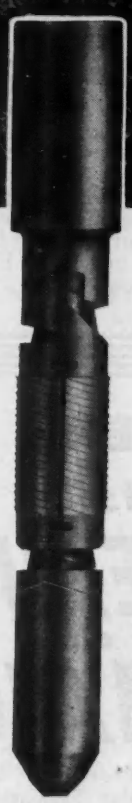
OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS.



Bowen-ITCO Releasing Spear

WORLD'S FINEST FISHING!

The world agrees with this bare-foot boy, fishing on a creek with his hand picked tools . . . it's the world's finest fishing.

But there's a limit to the luxury this kid is enjoying. In our business . . . serving the oil business . . . there's work to do, problems to solve. Unfortunately, oil men have to fish for steel pipe or tools stuck or lost in holes. Here's where we come into the picture.

Bowen Co. of Texas, Inc., has been designing and manufacturing precision fishing tool specialties for 15 years, and operators the world over agree they can't be equaled for quick, efficient, low cost recovery of pipe and miscellaneous equipment.

Let's talk about fishing!

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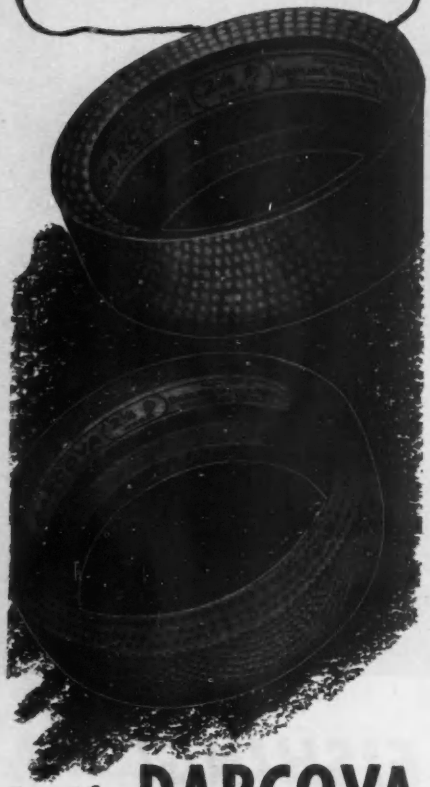

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ASSOCIATIONS

New officers of the Pacific Coast district API are, left to right, standing, D. B. Priest and W. M. Lyles, vice chairmen; John Isaacs, chairman of Spring Meeting arrangements; and H. F. Dangberg, vice chairman. Seated are C. T. Reichert, treasurer; M. B. Standing, vice chairman; E. C. Babson, chairman; and J. P. Shea, vice chairman.

Babson Is Selected to Head API Pacific Coast District

The Pacific Coast district, API Division of Production, has elected E. C. Babson, Union Oil Company of California, chairman for the 1950-51 term. C. T. Reichert, The National Supply Company, is treasurer, and Mrs. Elsie M. Edmiston is secretary.

District vice chairmen are H. F. Dangberg, Los Angeles Basin; J. P. Shea, Richfield Oil Corporation, San Joaquin Valley; D. B. Priest, General Petroleum Corporation, Coastal; W. M. Lyles, Lyles Construction Company, Coalinga-Kettleman.

AGA Convention is Set for Atlantic City in October

Plans for a convention program that will attract more than 10,000 gas industry members and dealers to Atlantic City October 2-6, were discussed at a meeting of the American Gas Association General Convention Committee under the chairmanship of George E. Whitwell, vice president, Philadelphia Electric Company.

EACH WAY-EVERY DAY
DAILY Flights to
VENEZUELA and JAMAICA!

Chicago & Southern Air Lines' fleet of 4-motored Douglas Skymasters now offers seven-days-a-week service through the Houston and New Orleans gateways to Caracas, Kingston, and Havana. Flights each way every day provide one-plane service from the Great Lakes to the Venezuelan oil capital. Ask your travel agent or nearest C&S ticket office.

CHICAGO & SOUTHERN AIR LINES

General Offices, Memphis, Tenn., U.S.A.

C★S

J. C. Karcher

Leo J. Peters

SEG Honors Geophysicist, Announces Paper Awards

Dr. J. C. Karcher, Dallas, has been elected to honorary membership in the Society of Exploration Geophysicists, the sixth such honor conferred by the society. A pioneer in seismic operations in the U. S., Dr. Karcher received the award in recognition of his outstanding contribution to the development of the reflection seismograph in oil exploration. He is chairman of the board of the Comanche Corporation.

Dr. Leo J. Peters, Pittsburgh, received the best paper award for "The Direct Approach to Magnetic Interpretation and its Practical Application," published in *Geophysics* for July, 1949. Peters is chief of the Geophysical Operations division of Gulf Research and Development Company.

Honorable mention went to Fred J. Agnich, Dallas, district supervisor for Geophysical Service, Inc., for his paper on "Geophysical Exploration for Limestone Reefs."

Instrument Society Will Hold 1951 Convention in Houston

The Instrument Society of America will hold the sixth National Convention and Exhibit in Houston in September, 1951. Plans for the meeting will be announced June 20 to leading industrial executives in the Gulf Coast area, at a luncheon sponsored by a committee headed by C. E. Naylor, president of Maintenance Engineering Corporation, Houston.

Other committeemen are Hines Baker, president of Humble Oil & Refining Company; J. R. Mares, vice president, Monsanto Chemical Company; Dr. A. P. Beutel, vice president, Dow Chemical Company; and J. H. Russell, vice president, Gulf Oil Corporation. Association President R. J. S. Pigott, director of engineering for Gulf Research and Development Company, and other members of the executive committee of the national organization will be present at the luncheon.

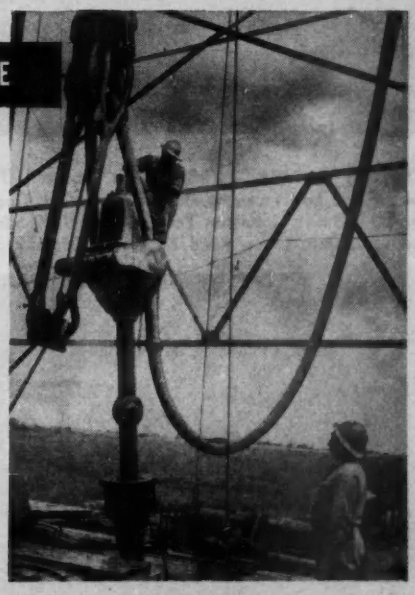
1950 Chicago Fair Features "Petroleum Service Center"

The story of oil and its role in helping to provide ever-heightened standards in American living will highlight the Petroleum Exhibit at the Chicago Fair of 1950, June 24 through Labor Day. Participating oil companies will have "Petroleum Service Center" with a lounge for guests, and an information booth to answer queries about the fair, Chicago, and travel.

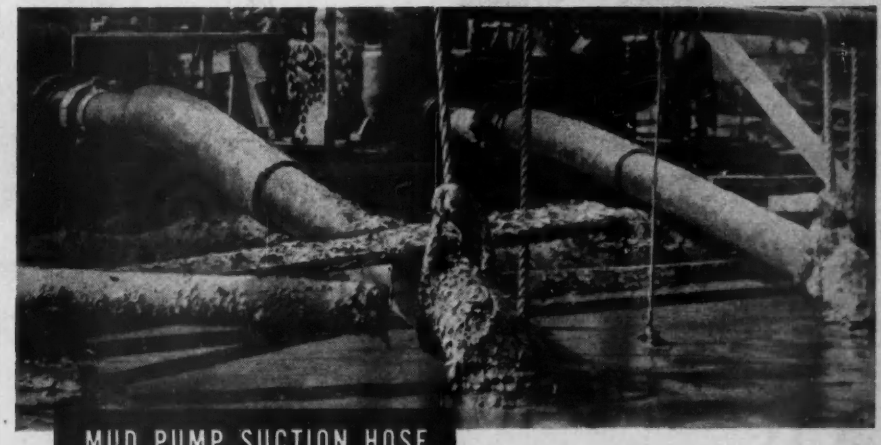
AT THE DERRICK, THE HOSE YOU DEPEND ON IS

HEWITT-ROBINS

ROTARY DRILLING HOSE



You can't buy better hose for oil well drilling . . . it's made by men who know their job! Hewitt built-in, leak-proof couplings assure an unrestricted, rubber-lined fluidway *all the way;* the high tensile duck carcass is heavily wire-reinforced to withstand extreme pressure, yet the flexibility you want is there; the tough Hewitt cover resists stripping action and abrasion. Whether you choose Monarch for deep well work, Ajax for medium depth drilling, or Conservo for the short holes, you get increased efficiency, lower operating costs, *longer useful hose life.*



MUD PUMP SUCTION HOSE

Best way to cut suction costs is to let Hewitt-Robins help! With Hewitt Mud Pump Suction Hose you prevent hose collapse and kinking because the carcass is reinforced with spiraled spring steel wiring. Built-in, clampless nipples are permanently sealed in the hose—and over everything is a rugged cover that's tougher than all the abuse it will ever get!

ROTARY FLEXIBLE HOSE

Another example of Hewitt-Robins oil-industry specialization. Used between the discharge end of the pump and the end of the standpipe line, Rotary Flexible Hose permits quick relocation of the line without disturbing the pump. It is an excellent vibration dampener and, unlike rigid pipe, it *won't crystallize.*

* * *

For full information on these and many other Hewitt-Robins hoses for the oil industry, call your Hewitt Rubber distributor, listed in the classified telephone directory, or write us.

HEWITT RUBBER DIVISION

HEWITT-ROBINS INCORPORATED

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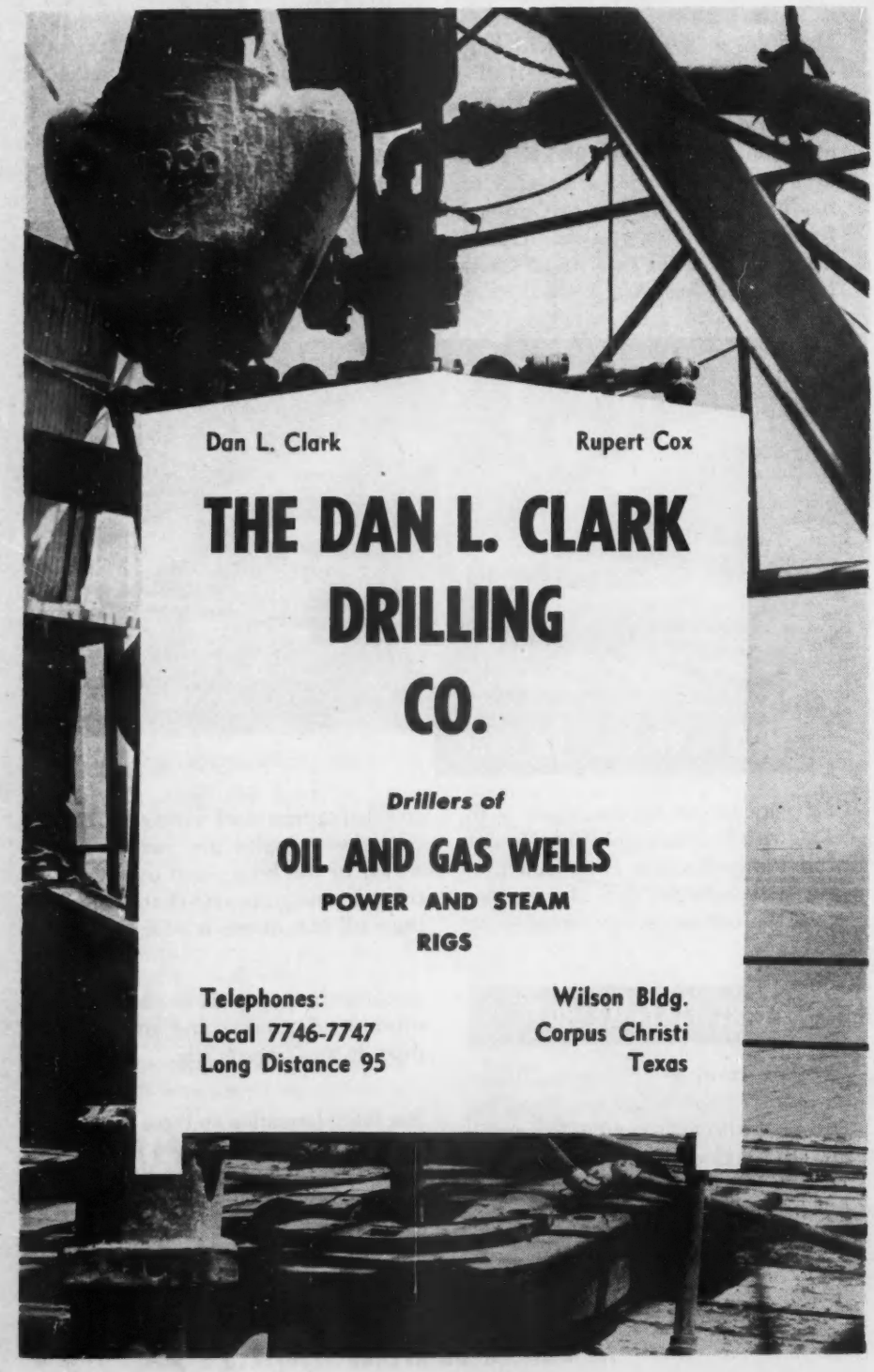
Having a Fine Time at the Houston Technical Club's annual picnic and golf tournament were these Gulf Coast oil men. Left to right are J. E. Smith, Johnston Testers, Inc.; Jack Silvey, Salt Dome Oil Company; Jimmie Jones, Reed Roller Bit Company; Joe C. Eason, oil field insurance; Bud Conley, WKM Company; Frank Champion, Spartan Tool and Service Company; Doyle Johnston, Camco, Inc., and Jack Fitzgibbon, manufacturers' agent. The event was held at the Texaco Country Club. Charles Brotherton, Gulf Oil Corporation, is president of the club.



Tulsa Engineers Club Chooses Stanolind Man as President

Lloyd E. Elkins, production research director, Stanolind Oil and Gas Company, has been elected president of the Engineers Club of Tulsa. Other officers include Jack H. Beesley, Baroid Sales division, National Lead Company, executive vice president; and Dale G. Savage, Service Pipe Line Company, treasurer.

Vice presidents include W. R. Clarke, Jones & Laughlin, Inc.—programs; J. E. Byers, Black, Sivalls & Bryson, Inc.—membership; Walter S. Smith, Process Equipment Company—entertainment; and P. O. Manion, Stanolind—publicity.

Directors are Ernest M. Newland, retiring president; W. L. Horner, Barnsdall Oil Company; and L. A. Ogden, The Pure Oil Company.

API Eastern Production Group Elects Cottingham Chairman

K. C. Cottingham, Ohio Fuel Gas Company, Columbus, Ohio, was elected chairman of the Eastern district of the API's Division of Production. He succeeds J. E. Shaefer, East Ohio Gas Company, Cleveland, who was named chairman of the advisory committee, succeeding S. M. Vockel, Waverly Oil Works, Pittsburgh. Jack Cashell, Preston Oil Company, Columbus, was elected secretary-treasurer.

District vice chairmen are Paul G. Benedum, Hiawatha Oil Company, Pittsburgh; R. L. Bird, Jr., Columbian Carbon Company, Charleston, W. Va.; H. R. Brankstone, Gulf Oil Corporation, Pittsburgh; R. W. French, Sohio Petroleum Company, Cleveland; John T. Galey, independent producer, Pittsburgh; Earl G. Hartman, Gordon Drilling Company, Mt. Pleasant, Mich.; E. T. Heck, Quaker State Oil Refining Company, Bradford, Penn.; and E. J. Straub, Equitable Gas Company, Pittsburgh.

Highway Transportation Meet Honors Mack Vice President

A citation in acknowledgment and appreciation of more than a half century of outstanding service to highway transportation was presented to David C. Fenner, vice president of the Mack Truck Company, at the Third Highway Transportation Congress sponsored by the National Highway Users Conference. Fenner joined the Mack company in 1911 and has been there continuously ever since.

At Sun Oil's Starr County Plant . . .

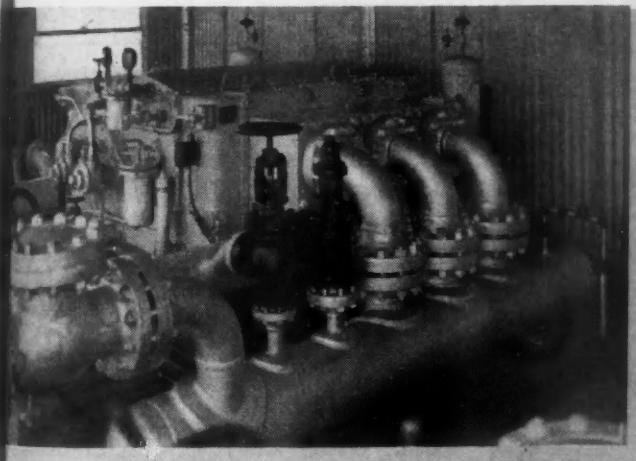
A 4-WAY JOB FOR MODERN COOPER-BESSEMERS

IN this new natural gasoline plant, engineered by Petroleum Engineering, Inc., there's good evidence of how well, how efficiently Cooper-Bessemer units of various types meet today's needs in power, compressing and pumping.

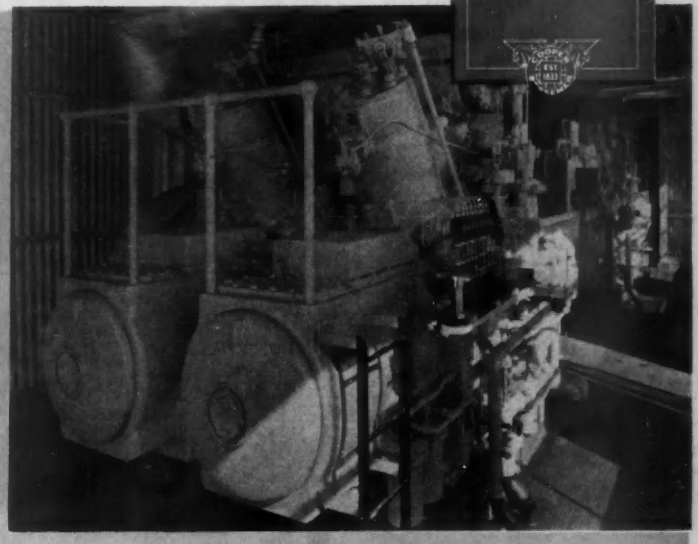
For in this one modern project, as shown here, you'll find Cooper-Bessemer in-line gas engines driving generators for all electric power requirements. And you'll find space-saving Cooper-Bessemer Twin-line pumps handling lean oil. These pumps in turn are direct-driven by compact Cooper-Bessemer GMX V-Type gas engines. Finally, last but not least, a 1,100 hp Cooper-Bessemer GMV Turboflow, tops today in compressor compactness and over-all economy, handles residue gas for return to a field reservoir.

To get at the reason *why* Cooper-Bessemers have been picked for all these services, you have only to weigh the important new developments introduced during recent years by one of America's *oldest* builders of engines and allied machinery.

Another Example of Efficient Power at Lower Cost



One of two Cooper-Bessemer Twin-line lean oil pumps in Sun Oil Starr County plant. High pressure side (foreground) is designed to operate on 41 API gravity lean oil, from 220 to 1100 psi while handling 248 gpm. Other side, in series, operates from 20 to 225 psi while handling 388 gpm.



Two Cooper-Bessemer GMX-4, V-Type gas engines, each direct-driving a Twin-line 6-cylinder lean oil pump through fire wall. Each GMX is rated 200 hp at 400 rpm.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Houston, Dallas, Greggton, Pampa and Odessa; Texas Tulsa Shreveport St. Louis Los Angeles

Foreign Guests attending a recent meeting of the Dallas-Fort Worth Chapter of Nomads were, left to right, J. M. De La Garza, Francisco Gomez and Juan Cortina of Mexico, and M. R. Garrison of Rio de Janeiro.

Eagle-Picher Lead Wool

STOPS

bottom water

Rule out the risk of oil-wasting bottom water shutdown by tamping Eagle-Picher Lead Wool in the hole. The finely stranded, flexible metallic wool makes a water-tight plug that seals every crack and crevice. Comes in convenient 50-pound sacks—easy to place in special cartridge-shaped Eagle-Picher Wire Containers sized to fit all casings. Order through your jobber.

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EAGLE EP PICHER

These 3 Eagle-Picher Bearing Metals meet most requirements

1. **Dreadnaught** — for extreme speed and heavy-duty conditions.
2. **Outlasta** — for medium speed and average-load conditions.
3. **Durable** — for low speed and light-duty conditions.

Exploration Geophysicists Choose Shreveport Oil Man

George E. Wagoner, Shreveport, has been elected president of the Society of Exploration Geophysicists for 1950-1951. Sigmund Hammer of Pittsburgh was elected vice president, and Francis F. Campbell of Tulsa was chosen secretary-treasurer.

Wagoner is the outgoing vice president and was secretary-treasurer in 1946. He is manager of exploration for the Southern division of The Carter Oil Company and a graduate of Colorado School of Mines. Dr. Hammer is in charge of the Gravity Interpretation section of Gulf Research and Development Company. Campbell is geophysical supervisor for Amerada Petroleum Corporation.

Richard A. Geyer, geophysicist with Humble Oil & Refining Company, Houston, continues a two-year term as editor of *Geophysics*, the society's journal.

LP-Gas Association Chooses Officers for 1950-51 Term

Peter A. Anderson, president of Utilities Distributors, Inc., Portland, Maine, was elected president of the Liquefied Petroleum Gas Association at its annual convention and trade show in Chicago.

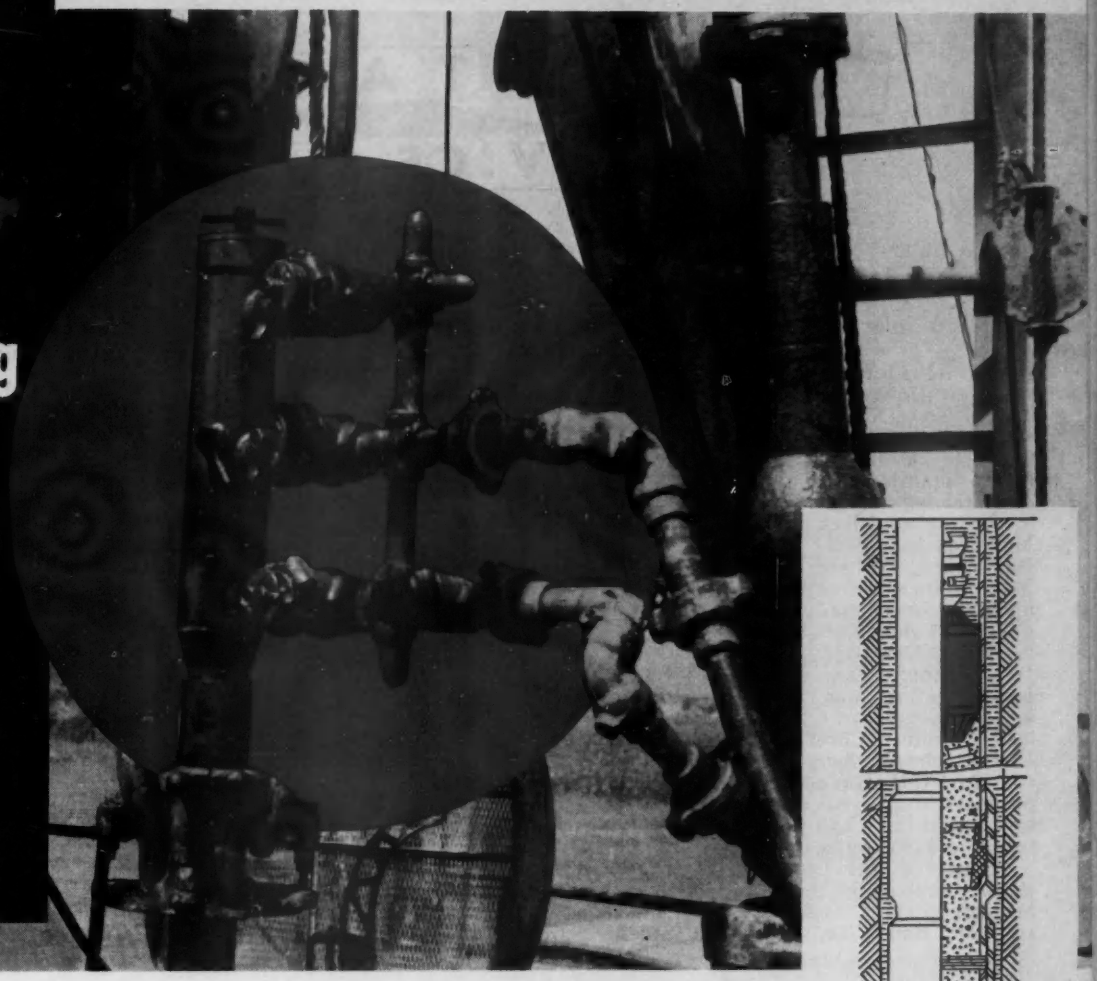
Other officers include William S. Lander, Rulane Gas Company, Charlotte, N. C., first vice president; F. N. Mabee, Colorado Natural Gas & Fuel Company, Denver, second vice president; Walter Miller, Dri-Gas Corporation, Chicago, treasurer, and Arthur C. Kreutzer, Chicago, secretary.

Howard D. White, who resigned last October as executive vice president to join Perlite Development Corporation, Albuquerque, N. M., has returned to the association in the same capacity.

San Joaquin Elects

Officers and directors of the San Joaquin Valley Oil Producers Association have been re-elected. In office are E. E. Pyles, president; H. F. Owen, vice president; L. W. Saunders, vice president; and C. O. Premo, secretary. The board of directors consists of L. L. Aubert, L. A. Cranson, J. M. Feldman, Richard Fenton, R. E. Gignoux, W. M. Keck, Jr., R. E. McCarthy, Ross McCollum, Harold R. Pauley, E. C. Reid, J. B. Spellacy, and W. C. Whaley.

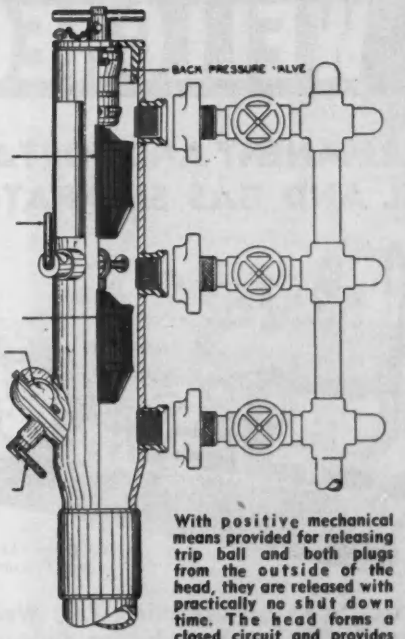
another *master* cementing job gets under way!



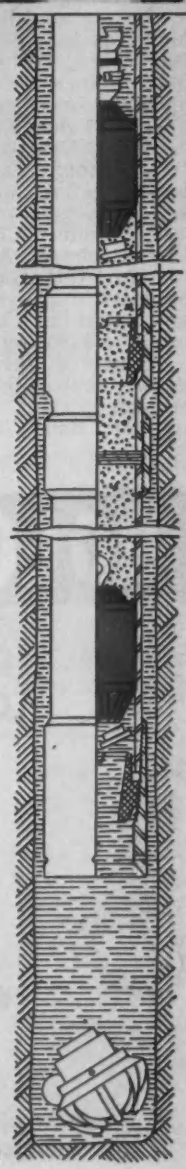
This operator knows in advance he will have a master cementing job, because he is using the Rector "Fulbore" Two Plug Method.

With the cement column separated from mud fluid by the two plugs, he knows uncontaminated cement will be delivered at the casing shoe. With the float assembly ejected from the shoe, he will get greater discharge capacity at lower pressure ... the uniform body of cement minimizes hazard of channelling. He knows cement cannot back up in casing string when the back pressure valve seats in the stall collar . . . that air entrainment in the cement column is prevented by the closed circuit, plug retainer type cement head.

Rector "Fulbore" Two Plug Cementing Method is the master of efficient, effective cementing. Ask your nearest RECTOR REPRESENTATIVE, SUPPLY MAN, OR *BLACKIE CLARK WELL SERVICE COMPANY* for full details or write for bulletins.



With positive mechanical means provided for releasing trip ball and both plugs from the outside of the head, they are released with practically no shut down time. The head forms a closed circuit and provides shut in control at all times during the operation.



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RECTOR FULBORE CEMENTING METHOD

ASK YOUR SUPPLY STORE FOR RECTOR "FULBORE" CEMENTING EQUIPMENT

EQUIPMENT AND SERVICE SUPPLIERS' NOTES

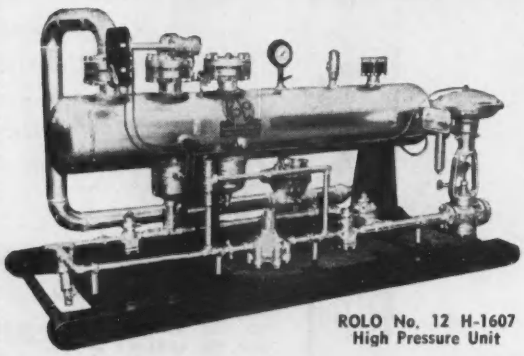
Core Lab Sales Engineers Train At Oil Base California Plant

Members of the sales engineering staff of Core Laboratories, Inc., Dallas, went to California for an intensive ten-day training course in the use of Black Magic oil base drilling fluid, White Magic oil emulsion mud, and other mud products manufactured by Oil Base, Inc., Compton, Calif. Under the new marketing pact signed last November, Core Lab is sole distributor for Oil Base products in all territories east of California and in Canada.

Pictured at the Los Angeles airport as they arrived in the Core Lab plane are, left to right, back row, Dick Duke, co-pilot; Bob Cole, pilot; Bill Stiles, Core Lab sales manager; Roy Hightower. Front row, Dick Willshusen, Vincent Thomas, Bill Brown and Bill Hilliard.

ROLO WELLCHECKERS

PERMANENT AND PORTABLE OIL AND GAS SEPARATORS



ROLO No. 12 H-1607
High Pressure Unit

Made in all sizes to fit any operation, Rolo Wellcheckers enable the operator to check his well production daily and to secure accurate records on which to compute royalties and taxes. Rolo Wellcheckers are shipped completely piped and ready to operate. See Composite Catalog or write for illustrated Bulletin.

Oil Well Metering Specialists

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2510 SOUTH BLVD., HOUSTON 6, TEXAS
BRANCHES: Corpus Christi, Midland, Kilgore, Tulsa, New Orleans, Casper, Edmonton, Alta.
EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

New Oil News Firm Will Cover Texas, Louisiana, New Mexico

Daily and weekly oil reports under the trade name of *Five Star Oil Reports* are being published by Petroleum News Corporation, a new oil publishing firm. Coverage includes Texas, New Mexico and Louisiana.

E. N. Redden of Houston is president of the company; W. D. Thorn, Dallas, is vice president; and Dr. Frank J. Gardner of Dallas and Houston is secretary-treasurer. L. R. Graham and T. D. Burnette are directors, with Graham West Texas manager and Burnette sales manager. Offices will be in Midland, Texas, and Houston.

In addition to the oil reports, Dr. Gardner's series of oil reference books will be continued under the sponsorship of Petroleum News Corporation. He is the author of the recent "West Texas Oil" reference and several other similar publications. For the new firm, his first work will be "Oil, the Land, and You," a handbook for land owner and lessor.

Courtney and Miller Promoted By Emsco Derrick & Equipment

Paul Courtney, manager of Houston plant operations, has been appointed vice president of Emsco Derrick and

Paul Courtney

A. H. Miller

Equipment Company. A. H. Miller has been named secretary and treasurer.

Courtney, who has been with Emsco since 1938, has traveled extensively in domestic and foreign fields. Miller has been with Emsco for 21 years and was secretary and assistant treasurer before his new appointment.

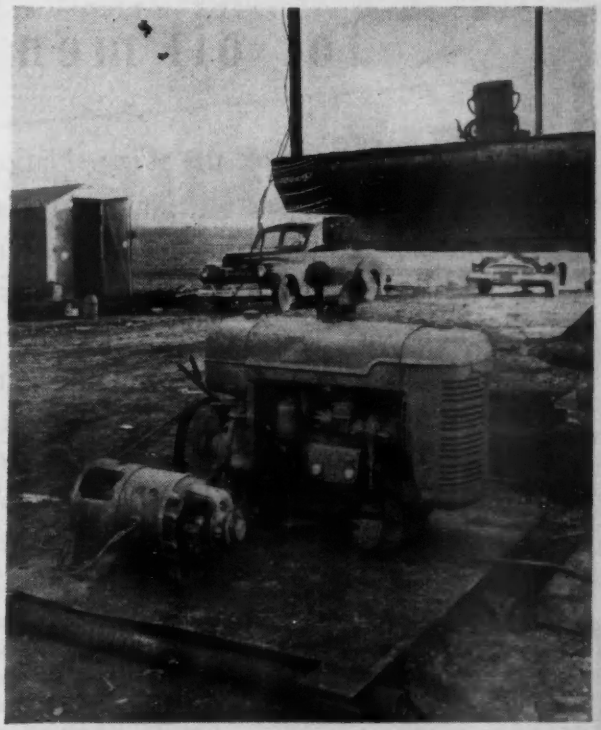
Patterson-Ballagh Appoints Two Sales, Service Representatives

E. G. Mitchell has been named sales representative for Patterson-Ballagh division of Byron Jackson Company, and will make his headquarters at Snyder, Texas, to cover the Scurry County area.

E. U. Bassham has been named joint representative for Patterson-Ballagh and BJ's Oil Tool division, with headquarters in Oklahoma City. Bassham, who had been with Cities Service Oil Company 20 years, will handle sales of the complete line of PB and BJ production items in Kansas and Oklahoma.

PAIR OF POWER PACKAGES

Two INTERNATIONAL Power Units Supply Water and Electricity for Drill Rig



The Crow Drilling Co. used two International U-2 Power Units on their drilling operation in the Spirit Lake field near Lewisville, Ark. One unit pumps water and the other U-2 and generator supplies electricity to the rig.

David Crow says, "We have practically standardized on these units for our small power requirements as a result of the good service the engines have rendered. Parts and service availability is very good and we now have about fifteen units in operation throughout Mississippi, Arkansas, Louisiana and Texas."

Your International Industrial Power Distributor, Dealer or oil field supply house is ready to supply you with power packages like these for your oil field power needs. The U-2A, successor to the U-2, is now rated at 24 h.p. You'll find durable, dependable Internationals in sizes ranging up to 180 net horsepower. Singly or combined, International engines will deliver the goods for nearly every oil field power requirement. Here is low cost power that pays off in productive work. See these engines now.

INTERNATIONAL HARVESTER COMPANY • Chicago

Tune in James Melton and "Harvest of Stars"—NBC, Sunday afternoons

Standardize on Power that Pays

INTERNATIONAL HARVESTER

INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

Ours is a
practical banking service
for oil men

The officers of the First National's Oil Department "speak the oil man's language," and have a practical acquaintance with the oil business . . . And they're at your service at any time; don't bother to telephone or write for an appointment — just stop by and start talking. You'll find the officer you're talking to is sincere in his desire to be helpful.

FIRST NATIONAL BANK

BUILT ON SERVICE 1st SINCE 1866

in Houston

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Carl E. Johnson, left, new board chairman of Sterling Electric Motors, Inc., turns special gavel over to Earl Mendenhall, the new president.

Sterling Electric Motors Elects Board Chairman and President

Carl E. Johnson, for many years president of Sterling Electric Motors, Inc., has been elected chairman of the board, and Earl Mendenhall, associated with Johnson more than 34 years, was elected president.

Johnson will continue to work on development and improvement of Sterling electric power drives. Mendenhall will devote his time to expansion of the manufacturing plants, engineering and sales offices.

West Coast Advertising Agency Celebrates 25th Anniversary

Dozier-Graham-Eastman, one of the largest industrial advertising agencies

M. M. Dozier

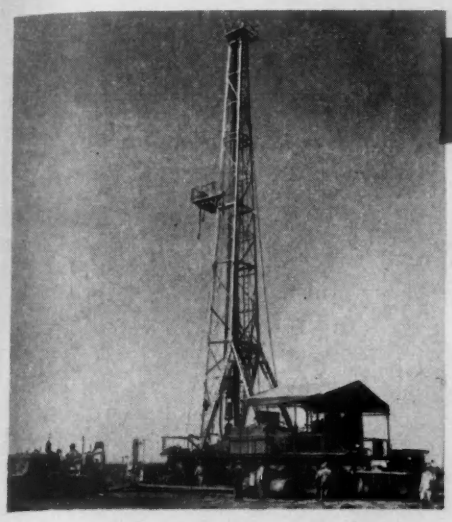
C. D. Graham

west of Chicago, this year observes its 25th anniversary, making it not only one of the largest but also one of the oldest agencies in the West.

S. C. Eastman

A member of the American Association of Advertising Agencies—one of the few industrial agencies to gain that recognition — DGE has a licensed and registered engineer on its staff to insure accurate technical copy.

More than 60 accounts are handled by the firm, and many of these are for companies which serve the petroleum industry.



Jackknife derrick being moved at Pierce Junction.

Close-up showing jacks in position on derrick moved at Winnie, Texas.

DERRICKS MOVED—ON THE DOUBLE!

Moves conventional or jackknife derricks—moves that used to take 8 days done in 1—moves that used to call for as many as 5 different types of specialized companies—now moved by one—Clark Sherwood.

Special derrick tracks that have carried 325,000 lbs. cross-country, and special jacks that raise 200 tons 1½ feet in 1½ minutes mean days and dollars saved.

"Don't make a move-without calling Sherwood."

Rig Building • Oil Field Construction • Tractors
Pile Driving • Trucks • Board Roads • Rental Derricks

Clark SHERWOOD

RIG BUILDING CONTRACTOR

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Practical Design Handbook For Engineers

By
DR. ALOIS CIBULKA
Department of Petroleum Engineering,
University of Houston,
Houston, Texas.

A new, much-enlarged edition which includes now three formerly separate publications; namely Refinery Piping Design, Modern Welded Steel Structures and Aerial Cable Tramways.

It is actually an engineering library of 400 pages, large size 12" x 9½" with hundred of illustrations, hundred of practical examples with charts and tables that reduce the time for solving difficult problems into seconds.

Part 1—Complete theory of strength of materials and structures; Part 2—Complete theory of modern welded steel structures; Part 3—Statically indeterminate structures. Rigid frames; Part 4—Pressure and vacuum vessels; Part 5—Refinery Piping Design; Pat 6—Shafts, gears, belts. Metals; Part 7—Hydraulics. Heat Transfers. Refrigeration; Part 8—Oils, hydrocarbons, chemicals; Part 9—Aerial Cable Tramways; Part 10—Complete tables of numbers and exact square for any number from one to ten thousand.

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Rent these modern tools and cut job costs. Every piece in perfect operating condition, available for immediate delivery.

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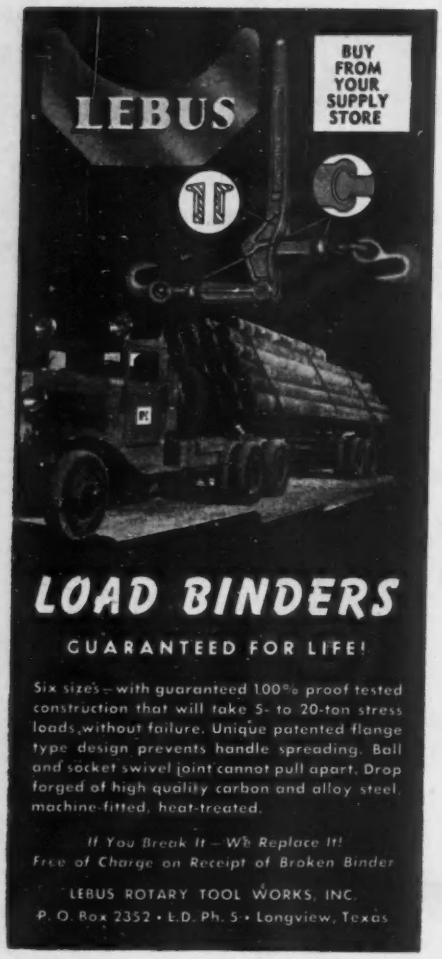
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Six sizes—with guaranteed 100% proof tested construction that will take 5- to 20-ton stress loads without failure. Unique patented flange type design prevents handle spreading. Ball and socket swivel joint cannot pull apart. Drop forged of high quality carbon and alloy steel, machine-fitted, heat-treated.
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SEE OUR CATALOG IN COMPOSITE CATALOG

Ask Your Favorite SUPPLY HOUSE

PARKERSBURG MACHINE COMPANY
PARKERSBURG, W. VA.

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Oil Men Are Byron Jackson Oil Tool Division Guests on "Ventura Day"

Byron Jackson Company, Oil Tool division, recently held "Ventura Day" at its main plant in Los Angeles. Pictured leaving the BJ plane as it arrived in Los Angeles are, left to right, George Stewart, Oil Well Supply Company; William C. Brooks, Byron Jackson Company; Watt Lupton, Shell Oil Company; Lynn Guttery, Bethlehem Supply Company; Charles Orrett, Howard Supply Company, Herb White, Republic Supply Company; Katz Kayser, National Supply Company; Red Foss, Tide Water Associated Oil Company; Del Flanders, BJ; Art Williams, Shell; Mike Smith, BJ (Patterson-Ballagh division); Cliff Divelbiss, PB; Ben Hilliard and Reid Grainger, BJ; Harry Buchanan, Bell & Burden; and Earl Rees, PB.

Byron Jackson Promotes Koberg To Manager of Southern District

E. R. (Ed) Koberg has been promoted to district manager for Byron Jackson Company's Louisiana, Arkansas and Mississippi area, with headquarters in Baton Rouge. Koberg has been at BJ Mid-Continent headquarters at Houston for the past 1½ years, and before that was in Louisiana for five years.

E. R. Koberg

John W. Cronin, Jr.

Before joining BJ, Koberg was with The National Supply Company and Murray-Brooks, Inc.

John W. Cronin, Jr., a graduate of Texas A. & M. College, has been appointed sales trainee to cover the South Louisiana and Mississippi fields. Cronin's last assignment was with the BJ Magnaflux unit which checked BJ equipment in various California and Mid-Continent fields.

Continental Supply Company Elects Bailey Vice President of Finance

The Continental Supply Company, Dallas, has elected D. M. Bailey vice president in charge of finance. Bailey has been general counsel and will continue in that office. C. L. Vickers, credit manager, has been elected treasurer.

With Continental since 1931, Bailey started as assistant general counsel, was made general counsel in 1936, and was elevated to assistant vice president in 1948.

Vickers joined Continental in 1930 as a credit clerk in Houston. He was successively promoted to district credit manager, credit manager, and assistant treasurer.

C. D. Conklin has been appointed manager of the Continental branch at Casper, Wyo., where he was previously a salesman.

LONGER THREAD LIFE WITH *Jimmie Gray* COMPOUNDS

MONEY BACK GUARANTEE

KANT-GALL TOOL JOINT COMPOUND

EXCLUSIVE 500-TON SPECIAL

LONG-LIFE DRILL COLLAR COMPOUND

Here's real thread protection against galling and washouts! Each one is engineered to do certain jobs best. That's why you can always break the joint when you use Jimmie Gray Compounds!

SOLD AT SUPPLY STORES EVERYWHERE

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... another reason why drillers prefer

Standco
NO-SMOKE
BRAKE LINING

Standco Brake Blocks are made of cabled cords of long fibre asbestos — woven solid and reinforced with bronze wire to prevent pulling loose on the belts. They will not burn or smoke or score brake rims.

More deep wells have been drilled with Standco than with all other blocks combined. It's your answer for low-cost hole-making.

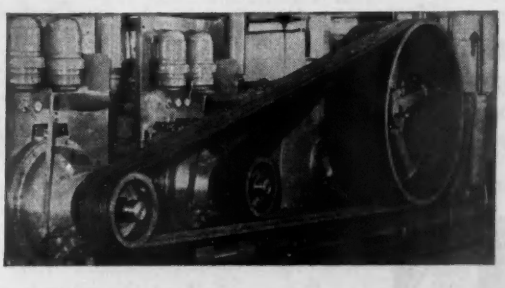
STANDCO BRAKE LINING COMPANY
Factory and General Offices
2701-2801 Clinton Drive — Houston, Texas

Celebrating
our 2nd year in the supply business . .

... with a complete line of oil and gas well supplies.
"If we don't have it ...
... we'll get it."

Dorroh
SUPPLY COMPANY
OIL & GAS WELL SUPPLIES
2214 Quitman St.
CApitol 9205
HOUSTON 10, TEXAS

WORTHINGTON
"QD" SHEAVES
and
WORTHINGTON-GOODYEAR
V-BELTS
For Oil Field and Industrial Use
Complete Factory Stock in **HOUSTON, TEXAS**



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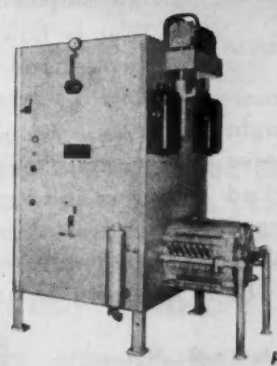
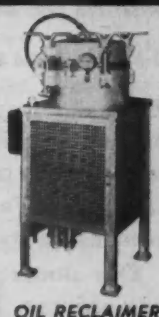
NEW ORLEANS — HOUSTON — DALLAS

FOR CLEAN OIL and CLEAN ENGINES
HILCO
OIL PURIFICATION EQUIPMENT
PURIFIERS · FILTERS · RECLAIMERS · CONDITIONERS


AIRLINE OIL PURIFIER

HYFLOW OIL FILTERS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There's a HILCO for every engine lubrication and fuel oil Purifying Problem

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Santa Fe's Open Door freight policy

The shipper "pays the freight."

The more he ships, the more business we do.

That is basic railroad economics.

Every day we are exploring possibilities for the growth of freight traffic, which can build business for the Santa Fe through fair and reasonable transportation charges.

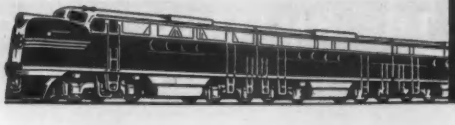
Our doors are always open to any shipper, large or small, who can help us serve his interests better in the matter of rates, car service and expediting the movement of freight shipments.

That is how the Santa Fe has grown—hand in hand with the people it serves.

That is the way it is always going to be. Our general freight traffic officers and Santa Fe freight representatives throughout the United States, are always ready to meet with you on any freight problem.

F. H. Rockwell, *General Freight Traffic Mgr.*
Santa Fe System Lines, Chicago 4, Illinois

Santa Fe—*all the way*



Santa Fe

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Closeup shows electric welder completing the inside weld on a length of pipe at the new pipe mill at the Orange, Texas, plant of Consolidated Western Steel Corporation. The welder is attached to a long boom over which a carriage, synchronized to the exact speed to produce a perfect weld, slides the pipe. The pipe has already been outside welded.

Consolidated Steel's Orange Mill Begins Manufacture of 30-Inch Pipe

Production of 30-inch diameter pipe has begun at Consolidated Western Steel Corporation's new large-diameter pipe mill at Orange, Texas. The mill will turn out approximately 50 miles of electric welded and expanded steel pipe a month when it reaches full production.

The mill is housed in a steel building more than 900 feet long, converted from the naval shipyard facilities purchased from the government last year. High speed, assembly line production carries flat steel plate from storage yard to shipping yard as finished pipe.

Rockwell Adds Representative for Pittsburgh and Nordstrom Sales

W. O. Brady has joined the sales force of Rockwell Manufacturing Company, and will cover the state of Alabama to handle meter, regulator and valve lines of Pittsburgh Equitable Meter and Nordstrom Valve Division of Rockwell.

W. O. Brady

Brady has been with United Gas Corporation at Gulfport, Miss., since 1939. He spent four years in the Army and emerged a captain.

Eastman Acquires Bar-X Tool

The Bar-X Tool Company is now being operated as the Oil Tool division of the Eastman Oil Well Survey Company. Heading the new division is John Stark, general manager, with headquarters in Denver. Roland Armell and Charles Brokaw have been named Pacific Coast and Gulf Coast managers, respectively.

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Hughes Tool Company Announces Engineering Department Promotions

Three key promotions in the Engineering department of Hughes Tool

F. H. Berleth

Lyle L. Payne

Company have been announced by Daniel J. Martin, vice president—engineering. Lyle L. Payne has been named chief engineer, with F. H. Berleth as assistant chief engineer. Williford Chippendale has been appointed manager of the Design and Drafting division, Product Engineering department.

W. Chippendale

Payne was employed by Hughes in 1929 as a draftsman, and served as a division field engineer from 1931 to 1940, when he was made a produce engineer in Houston. He was promoted to assistant chief engineer in 1943. Early in 1949 he was made assistant to the vice president—engineering, in which position he will continue. Payne was graduated from Rice Institute in 1930 with a degree in mechanical engineering.

Formerly manager of the Design and Drafting division, Berleth joined Hughes in 1917 as a part-time employe while attending Rice Institute. He was graduated in 1922 with a B.S. in mechanical engineering. During World War II Berleth was chief engineer at the Hughes Aircraft Strut Plant.

Chippendale joined Hughes in 1929 as secretary to the chief engineer. He served as a draftsman from 1935 to 1939, when he was made supervisor in charge of design and drafting and in 1942 was named assistant chief draftsman. In 1947 he was promoted to assistant manager of Product Design.

Visco Products Assigns Wallace To Gulf Coast District as Manager

Carl L. Wallace has been appointed Gulf Coast division manager for Visco Products Company, with headquarters in Houston. He was formerly district representative covering northern Louisiana and southern Arkansas.

Vernon G. McBride, who replaces Wallace, will headquarter in Ruston, La.

Aubrey L. Adams has been appointed district representative in the Houston area, replacing David E. Murphy, who has been transferred to Long Beach, Calif., as representative.

Paul H. Mallette has been appointed district representative with headquarters in El Campo, Texas.

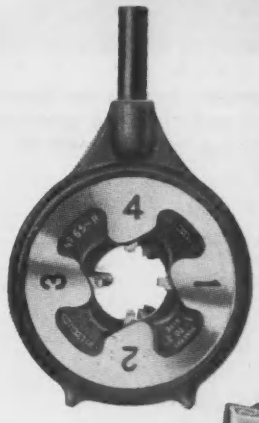
NOW New Streamlined

RIDGID 65R

Die Stock that WON'T JAM

while threading with power drive or by hand

New *JAM-PROOF* drive plate automatically kicks out driving ratchet pawl when standard length thread is cut.... You don't have to watch it—lead screw can't jam on workholder.



Right Here is the simple foolproof mechanism that makes 65R automatically *JAM-PROOF.*

You can convert your present 65R to new JAM-PROOF type — buy new drive plate, put in place of old plate.

All other RIDGID 65R features remain the same

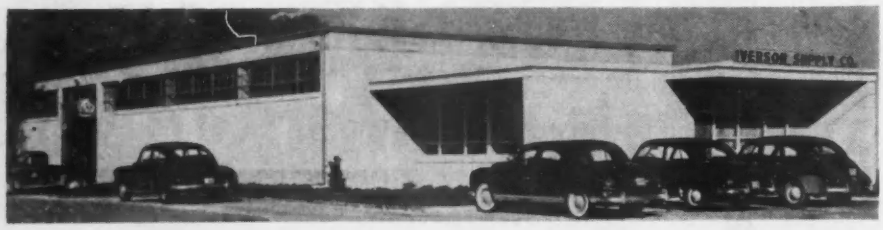
Perfect threads on 1" to 2" pipe with 1 set of high-speed steel dies—sets to pipe size in 10 seconds—mistake-proof self-centering workholder sets instantly—and now it's *JAM-PROOF.*

Buy new JAM-PROOF RIDGID 65R at your supply house

RIDGID

WORK-SAVER PIPE TOOLS

THE RIDGE TOOL CO. • ELYRIA, OHIO



Gulf Coast Operators are now served by Iverson Supply Company from its new division office and warehouse at 340 South 66th Street, Houston. A complete stock of drilling, production and refinery equipment is available from the Houston location, which is under the direction of R. B. (Bob) Yanaway, division manager.

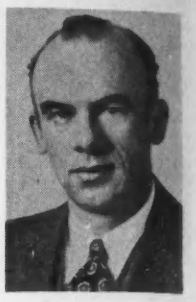
COMPLETE
FACILITIES
...for the oil business

CAPITAL and SURPLUS
$27,500,000
Largest in the South

REPUBLIC NATIONAL BANK
of DALLAS
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Oil Base, Inc., Sales Manager Assigned to Mid-Continent Area

Thad Randolph, sales manager for Oil Base, Inc., has been transferred temporarily to the Mid-Continent to relieve J. A. Moore, Oil Base vice president, who returns to headquarters in Compton, Calif.



Thad Randolph

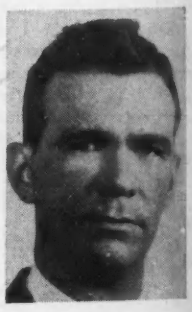
Randolph will be stationed at the Dallas office of Core Laboratories, Inc., and will serve as liaison director between the two companies, helping with the training of Core Lab sales engineers in the use of Black Magic and Oil Base mud conditioning products. He will cover all areas served by Core Lab.

Dowell Incorporated Announces Four Major Field Staff Promotions

Four major promotions in the field staff were announced by Dowell Incorporated. W. N. (Woody) Estel, district manager at Midland, Texas, has been promoted to sales development manager and transferred to Tulsa. Ralph H. Smith, district manager, Houston, moved to Midland as manager. John S. (Jack) Talbot, district sales engineer in Houston, has been promoted to manager of that district, and E. F. Kelly, Houston development engineer, has been promoted to district engineer.

R. H. Smith

W. N. Estel



J. S. Talbot

Estel, a graduate in business from the University of Tulsa, joined Dowell in 1940. He had previously been with The Carter Oil Company.

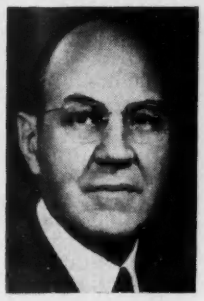
Smith, a petroleum engineering graduate from the University of Texas, joined the company in 1944 as district engineer in Houston.

A graduate of the University of Oklahoma, Talbot obtained his degree in petroleum engineering. He joined Dowell in 1946.

Kelly was with Producers Transportation and Marketing Company before he joined Dowell in 1946 at Houston.

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Frank Purnell



J. L. Mauthe

Youngstown Sheet and Tube Elects Board Chairman and President

Frank Purnell, president of The Youngstown Sheet and Tube Company since 1930, has been elected chairman of the board of directors. J. L. Mauthe has been elected president of the company, and Alfred S. Glossbrenner was named vice president in charge of operations.

A. S. Glossbrenner

Mauthe joined Youngstown in 1935 after many years' experience in the steel industry. He was appointed general superintendent of the Youngstown district in 1937 and in 1943 was elected vice president in charge of all operations.

Glossbrenner joined the company in 1935 as assistant superintendent of the hot strip mill at the Campbell Works. In 1947 he was elected assistant vice president in charge of steel operations at all plants.

Perforating Guns Atlas Appoints Mercier Kansas Division Manager

V. J. (Mike) Mercier has resigned as sales manager of Mountain Iron and Supply Company, Wichita, Kansas, to accept appointment as Kansas division manager, Perforating Guns Atlas Corporation with headquarters in Wichita. Prior to his position with Mountain Iron, Mercier was Kansas division engineer for Lane-Wells Company, and previously had been eight years in seismograph exploration work.

V. J. Mercier

Tyson Smith Buys Pipe Plant

The Tyson Smith Company has purchased from Mason Brothers Construction Company a plant and pipe shop with railroad facilities, on a five-acre site in Houston. The property includes an air conditioned office building, ten-ton overhead cranes, machinery and tools. Tyson Smith will manufacture bolted and welded tanks, stainless steel products, and chain link wire fence.

WECO
FIGURE 602
UNION
6000-LB. TEST

THE TIME AND SPACE SAVING CHAMPION for *HIGH PRESSURE CONNECTIONS IN CLOSE QUARTERS . . .*

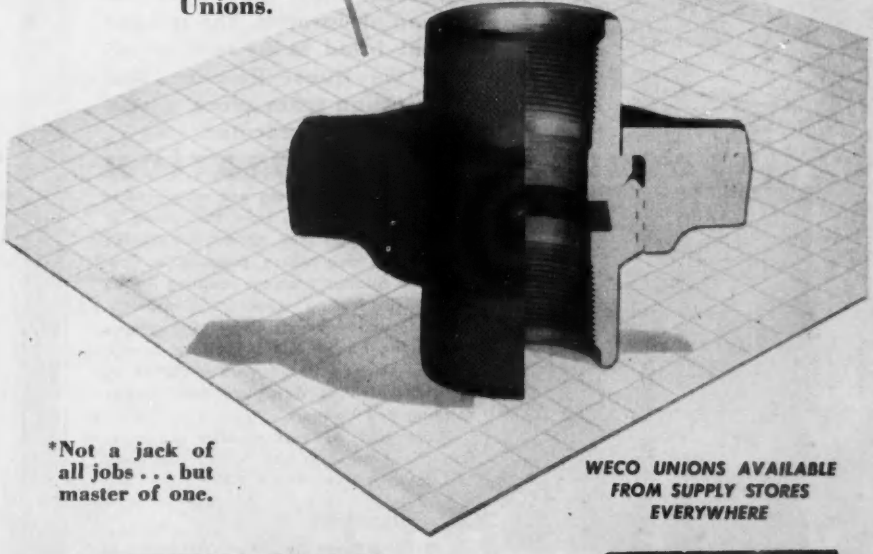
From sub end to sub end . . . from wing nut tip to wing nut tip, WECO Figure 602 Union is a champion in every respect. Designed for compactness, and retaining all the features of strength, speed and easy handling, perfect sealing, fast make-up, Figure 602 is ideal for high pressure connections in close quarters.

Figure 602 Union has forged steel subs with rugged wall sections . . . heavy Acme wing nut threads. The traditional WECO metal-to-metal seal is protected against abrasion and corrosion from line fluids and gases by a replaceable resilient seal ring which has proved capable of withstanding the extremely high pressures of the Oil Industry. With or without the resilient seal ring, Figure 602 gives you a perfect seal.

Figure 602 is ideal for welded installations. The resilient seal ring can be replaced simply by backing-off the wing nut, and the seal renewed without cutting off the sub ends.

Specify this time and space saving champion when making up connections in close quarters. It is available in sizes 1″ through 4″; has a cold working pressure of 3000 lbs. per square inch.

ASK YOUR WECO REPRESENTATIVE about Figure 602 as well as other WECO "Job-Master"* Unions.



*Not a jack of all jobs . . . but master of one.

WECO UNIONS AVAILABLE FROM SUPPLY STORES EVERYWHERE

WELL EQUIPMENT MFG. CORP.
Subsidiary of Chiksan Company
HOUSTON 1, TEXAS
Exclusive Sales Representative Outside Mid-Continent Area
CHIKSAN COMPANY
Brea Calif. New York 7
Export Sales CHIKSAN EXPORT COMPANY, Brea Calif. New York 7

WECO
Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment

Kobe Opens New West Texas Shop

Kobe, Inc., opened a hydraulic pump repair shop at Odessa, Texas, with a "shopwarming" for West Texas oil men. In the right foreground of the photograph are shown Ray Elner (center of trio), Southern area sales manager for Kobe, and Peck Hardee and Bob Schuehle, both with Texas & Pacific Coal and Oil Company.

The new shop has complete facilities for tearing-down, reassembling, and testing pumps.

Edward Valves Research Facilities To Be Doubled by Expansion Program

The new physical, chemical and metallurgical laboratories of Edward Valves, Inc., East Chicago, Ind., are being increased nearly 50 percent in size with construction of a new unit.

The addition will house Edward-designed special mechanical testing equipment for Edward and Nordstrom valves. The building is being constructed on three levels to facilitate operation of equipment which will duplicate actual service conditions.

Eastman Names Somner Company As Mississippi, Louisiana Agent

The W. L. Somner Company, Inc., has been named exclusive agent for Eastman Oil Well Survey Company in Brookhaven and Tinsley, Miss., and Shreveport. W. L. Somner is president of the company, and H. G. Lawrence is general sales manager of the Louisiana concern.

H. G. Lawrence

W. L. Somner

The company will handle rentals of Eastman Single Shot and Drift Indicator instruments and casing rollers. Eastman directional drilling services and oil well surveys are also available through the Somner Company, with Eastman field engineers directing and performing the work.

Mid-Continent Manager Appointed For Pacific Centrifugal Pumps

Pacific Pumps, Inc., Huntington Park, Calif., has appointed A. F. Canada manager of centrifugal pump sales for the Mid-Continent area, with headquarters in Tulsa. Canada joined Pacific in 1945 as Tulsa district manager. In his new position he will be in charge of Rocky Mountain, Mid-Continent and Gulf Coast territories.

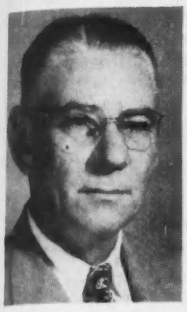
A. F. Canada

Also announced were the appointments of D. W. Conkling and A. L. Anheier as centrifugal pump sales engineers, Tulsa; and W. L. Wathen as centrifugal pump sales engineer, Houston.

A SURE CURE
for
PARAFFINITIS*
There is no need to put up with this malady . . . no need to give your wells frequent and costly treatments of steaming out or pulling the rods to remove paraffin and maintain production.
Huber Paraffin Scrapers are a permanent cure for paraffin accumulation. Attached to the sucker rods, they wipe the tubing walls clean of paraffin. The scraper blades are shrink-fitted to the rods which are rotated by the Huber Rotating Rod Hanger. Wiping action takes place as the string is rotated and reciprocated.
DOUBLE BENEFIT ROTATION
The combined rotating and reciprocating motion wipes paraffin from the tubing in particles so small they go out in solution . . . can not clog tubing, scrapers, or flow lines. Rod rotation prolongs coupling life by equally distributing wear . . . prolongs pump life and efficiency by equalizing wear on working barrel. Get this added benefit while eliminating paraffin accumulation by installing Huber Scrapers and Huber Rotating Rod Hangers.
Cure your wells of paraffin accumulation . . . install Huber Paraffin Scrapers and Rotating Rod Hanger, NOW!
* Congestion caused by the accumulation of paraffin in pumping wells.
For further information see your local supply store, or write
J. M. HUBER CORPORATION,
Box 831 . . . . . Borger, Texas
HUBER
PARAFFIN SCRAPERS
SCRAPE AS THEY ROTATE AS THEY RECIPROCATE

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Salesman Joins Cameron to Handle Non-Lubricated Lift-Plug Valve



V. G. Ibert

V. G. Ibert has joined the Sales department of Cameron Iron Works and will specialize in the sale of the new Non-Lubricated Lift Plug (LP) Valve. Ibert, who will have headquarters in Houston, was previously employed as an operator at the Abercrombie - Harrison Gasoline plant at Sweeney, Texas, and the Cities Service Refinery and Cit-Con Oil Corporation at Lake Charles.

O'Bannon Company Sales Personnel Assignments, Transfers Announced

Walter O'Bannon Company, Tulsa, has appointed H. D. Smith, former sales representative at Great Bend, Kansas, as assistant sales manager, Tulsa. Other changes were the transfer of A. L. Dunn from Seminole, Okla., to Great Bend; and J. D. King from Kilgore, Texas, to Seminole. J. B. Marshall has been appointed sales representative in New Mexico and part of West Texas. U. J. Breece, California representative, has been transferred to Tulsa, and is replaced by M. L. Henry, formerly in the Northern Oklahoma territory.

Power Application Engineer Joins Stewart & Stevenson Services, Inc.

N. J. Herman

N. J. (Tiny) Herman has joined Stewart and Stevenson Services, Inc. as a power application engineer in the Engine division of the Houston headquarters. Herman, who has had wide experience in oil fields in Texas and in the East, will work primarily in the development of industrial and oil field applications for diesel power.

Philco Receives Contract for Pipe Line Microwave System

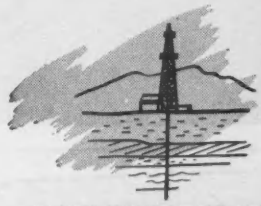
Philco Corporation has been awarded an order to supply Humble Pipe Line Company, Houston, with equipment for a new microwave communications relay system 400 miles long.

The new system will parallel Humble's pipe line facilities from Houston to Kemper, Texas, and will initially provide eight voice circuits and a combination of teletype, telegraph and telemeter circuits.

Baker Moves New York Office

Baker Oil Tools, Inc., has moved its New York City office to 250 Park Avenue, Suite 307. Russ V. McIntire is New York export manager.

TOPS IN THE FIELD!



LESS COST PER FOOT
Faster Penetration
Greater Footage Per Bit
Less Round-Trips

OUTSTANDING ENGINEERING RESEARCH
Diamond Bits, Washover Shoes, Reamers. Core Barrels, Handling Equipment. Drilling Technique —Field Service.

PROVED PERFORMANCE
Production Drilling
Exploratory Drilling
Wild Cat Drilling

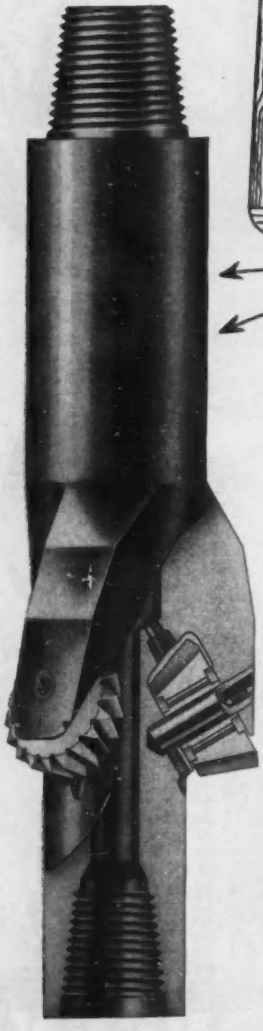
Base Points:
Salt Lake City, Utah
Casper, Wyo., Worland, Wyo.
Hobbs, N. M., Shreveport, La.
Purcell, Oklahoma

LESS COST PER FOOT CHRISTENSEN DIAMOND PRODUCTS

CHRISTENSEN
DIAMOND PRODUCTS CO.
1975 SOUTH SECOND WEST • SALT LAKE CITY, UTAH • TELEPHONE 6-8738

California Representative: Mercury Oil Tool Co. Los Angeles - Bakersfield
Export Representative: R. J. Eiche & Associates, Inc. Los Angeles - New York City
Canadian Representative: James Emrick Company, Ltd. Edmonton, Alberta

A Field Trip by Air has been completed by W. H. Whitney, president and general manager of Whitney Chain & Manufacturing Company, Hartford, Conn. Accompanied by J. W. Anderson, sales manager, Whitney covered more than 10,000 miles in calling on field offices and distributors about the country. Pictured, left to right, are C. B. Lane, Dallas district manager; J. W. Wiley, Beech Aircraft Corporation; Anderson; Whitney; L. J. Snow, pilot; and E. P. Coty, Hanson Whitney Machine Company.



Here's the tool you want for hole enlarging—a husky, fast-digging tool in *any* formation —the GRANT HOLE ENLARGER!

It's Rugged—three hard-faced cutters turn on big precision ball and roller bearings. Massive body and cutters are of heat-treated alloy steel.

It's Streamlined—designed to give maximum return circulation.

It's Self Cleaning—jetting action is directed against each cutter.

It's Fast—unique spiral cutter design eliminates tracking, insures complete and positive cutting action.

It's Economical—cutters are replaceable on the rig—an important time and money saver.

Write for Bulletin 38 giving full details and specifications —or see your Grant representative. Refer to the Grant Section in the Composite Catalog.

Proven Grant Tools—Used Where Performance Counts

Hydrostatic Bailers	Bulletin No. 11
Liner Pullers	Bulletin No. 14
Pressure Releases	Bulletin No. 15
Casing Scrapers	Bulletin No. 17
Wall Scrapers	Bulletin No. 20
Bottom Hole Scrapers	Bulletin No. 21
Underreamers (Rotary)	Bulletin No. 24
Underreamers (Cable Tool)	Bulletin No. 27
Hole Enlargers	Bulletin No. 38
Reamers	Bulletin No. 43
Hydrostatic Perforation Cleaners	Bulletin No. 50
Dump Bailers	Bulletin No. 51
Roller Cutter Shale Bits	Bulletin No. 54
Sand Pumps	Bulletin No. 55
Well Cleanout Equipment	Bulletin No. 57

Write for Descriptive Bulletins on these Grant Tools

GRANT OIL TOOL COMPANY

Main Office and Plant
2042 E. Vernon, Los Angeles 11, Calif.
Branches Throughout California and The Mid-Continent

A. O. Smith Corporation Elects Floyd Executive Vice President

J. M. Floyd, who has been vice president in charge of manufacturing for A. O. Smith Corporation, has been named executive vice president. He will take over general operating supervision of the company under the general direction of the president.

J. M. Floyd

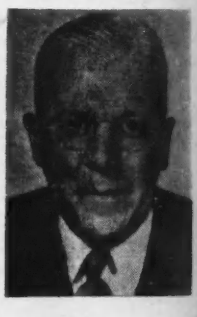
Floyd has been in charge of manufacturing since he joined A. O. Smith in 1936. He had previously been works manager for Bendix Aviation Corporation's Bendix Products division.

Floyd is also a member of the board of directors and of the executive committee of A. O. Smith, and is vice president of A. O. Smith Corporation of Texas.

Feldmann Named Vice President By Worthington Corporation

Walther H. Feldmann, formerly president of a subsidiary company, Electric Machinery Manufacturing Company of

Walther H. Feldmann



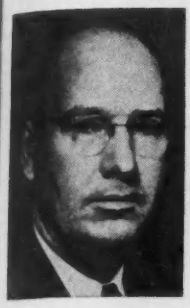
John J. Summersby

Minneapolis, has been named vice president in charge of sales for Worthington Pump and Machinery Corporation.

Other key appointments include that of John J. Summersby, formerly vice president in charge of sales, as vice president in charge of purchases. Frederic W. Thomas, formerly assistant general manager of purchases, is now general manager of purchases. Carleton Reynell, formerly general manager of purchases and traffic, has been named general representative, Sales and Purchasing departments.

EQUIPMENT and SERVICE SUPPLIERS' NOTES

National Supply Appointments Include U. S., Canada Executives



M. R. Brinkerhoff

Robert J. Stoup

M. R. Brinkerhoff, a veteran of more than 30 years with The National Supply Company, has been appointed assistant division credit manager, with headquarters in Shreveport. His territory includes Louisiana, Mississippi, Alabama, East Texas and southern Arkansas. For the past ten years he has been district manager at Shreveport.

Robert J. Stoup has been named plant metallurgical engineer at the Ambridge, Penn., plant of National Supply's Spang-Chalfant division. He has been with the company since 1936.

Thomas B. Herndon

R. Wesley Burns

David C. Neely, field engineer for Spang-Chalfant division at Houston, has been transferred to the Feld Engineering department at Tulsa. C. C. Brush, sales representative, Houston, has also transferred to the Tulsa Field Engineering department.

The National Supply Company has appointed Thomas B. Herndon as development engineer, with headquarters in Fort Worth. His appointment will permit a close liaison between industry requirements and product development, the company stated. Herndon, an engineering graduate of The Rice Institute, joined National Supply in 1936 after a year with Gulf Pipe Line Company. He has served in various technical and sales assignments in both domestic and foreign fields.

R. Wesley Burns has been named divisional manager for The National Supply Company, Ltd., at Calgary, Alberta, Canada. Burns, who has been with the company since 1921, was formerly assistant division sales manager at Calgary. He is now active operating head of the Canadian company.

The Canadian branch has established a store at Stettler, Alberta, with D. O. Fairbairn, formerly sales representative at Edmonton, as manager, and D. K. Eastcott as field representative.

The New 1950

INTERNATIONAL OPERATIONS ISSUE

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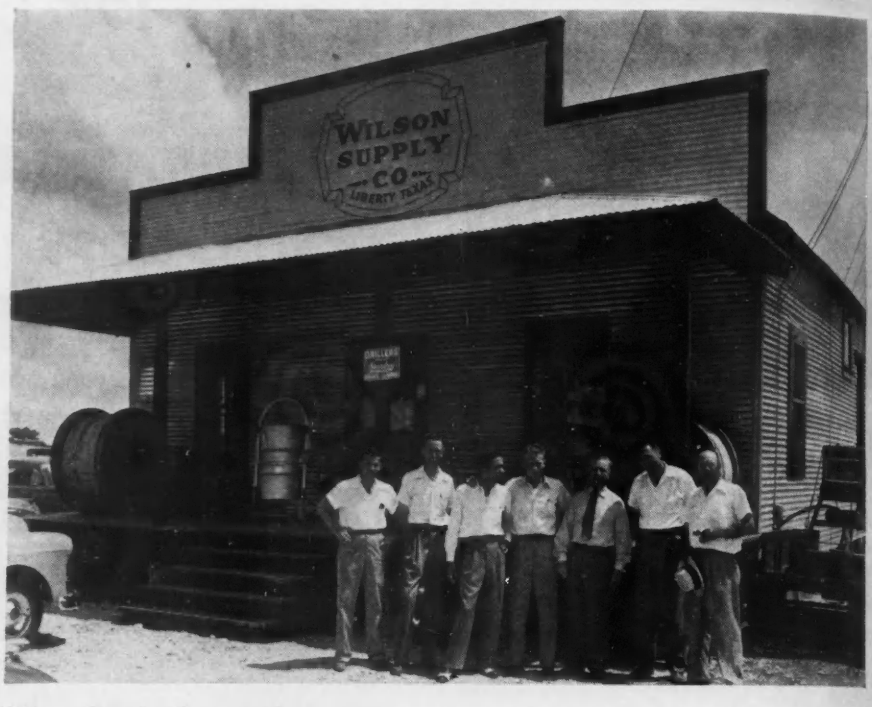
EQUIPMENT and SERVICE SUPPLIERS' NOTES



Wilson Supply Company's new store at Liberty, Texas, was opened with a fish fry for several hundred oil operators, superintendents, drillers, warehousemen and crews. Pictured, left to right, are Roy Layton, pickup driver; Reed Whitten, field man; Don Collins, store man; C. C. (Red) Hardamon, store manager; W. D. Wilson, president of Wilson Supply Company; S. G. (Doc) Wyatt, manager of stores; and John Yerger, Oil Well Manufacturing Company.

Bethlehem Supply Company Announces Changes in Field Sales Personnel

F. J. Wilbanks, former field representative at Seminole, Okla., for Bethlehem Supply Company, has been promoted to store manager and field representative, succeeding the late H. R. Hoover. E. L. Sharp, formerly assistant store manager at Duncan, Okla., has been transferred to Seminole as field representative.

R. F. Wyers, formerly store manager and field representative at Lindsay, Okla., has been transferred in the same capacity to Duncan. F. D. Cox has been transferred from Casper, Wyo., to Duncan as assistant store manager.

J. C. LeFlore has been promoted from field representative to store manager and field representative of the Lindsay store. Richard Evans, Jr., formerly in Oklahoma City, has been transferred to Lindsay as field representative.

C. W. Young, formerly special representative at Garden City, Kansas, has been transferred to Russell, Kansas, and promoted to store manager and field representative. L. R. Cousland, formerly assistant store manager at Great Bend, Kansas, has been transferred to Garden City as special representative.

H. B. Karstetter, formerly field representative at Casper, has been promoted to store manager and field representative.

T. C. McCord has been employed as a field representative in the Used Material department at Kilgore, Texas.

C. A. Patterson, formerly in the Odessa, Texas, store, has been transferred to Snyder, Texas, and promoted to field representative.

K. G. Wagner has been appointed store manager and field representative at Corpus Christi, Texas. J. D. Reynolds was promoted to field representative at Kilgore, Texas, and Clyde Ricks was made assistant store manager at New Iberia, La.

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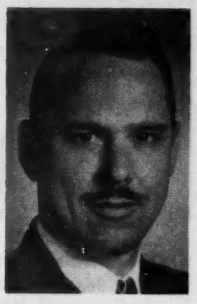
Wm. G. Martin, Mgr.
LAWN HOTEL
3718 Lemmon Ave.
John W. McCann, Mgr.
LAKEWOOD HOTEL
1818 Abrams Rd
Paul C. Bryant, Mgr.
and now - the new LYNN HOTEL
101 Air Conditioned Rooms . . 3405 Gaston Avenue . . Charles A. Closson, Mgr.

EQUIPMENT and SERVICE SUPPLIERS' NOTES

Morrow and Handley Establish Midwestern Geophysical Lab

M. E. Morrow and E. Jack Handley, formerly with Century Geophysical Corporation, Tulsa, have organized the Mid-

M. E. Morrow



E. Jack Handley

western Geophysical Laboratory with Morrow president, and Handley executive vice president. The new company will engage in contract seismic surveys and the manufacture and development of geophysical equipment and other industrial instruments.

In addition to field crews for contract seismic work the laboratory will employ more than 100 technicians and craftsmen.

Youngstown Announces Appointments, Adds Four District Sales Offices

John M. Stevens, Bartlesville, Okla., has joined The Youngstown Sheet and Tube Company as a development engineer in its Mill Research and Development department. Formerly a mechanical engineer for Phillips Petroleum Company, Stevenson is now in Youngstown's Tulsa office, and will later move to Dallas. He will work principally on pipe line problems.

Youngstown has designated four former sub offices as district sales offices. They are at Grand Rapids, Mich., with E. N. Hagstrom as manager; Des Moines, Iowa, with W. J. Burt manager; Milwaukee, with J. J. McMahon manager; and Minneapolis, with Charles S. Hogan manager.

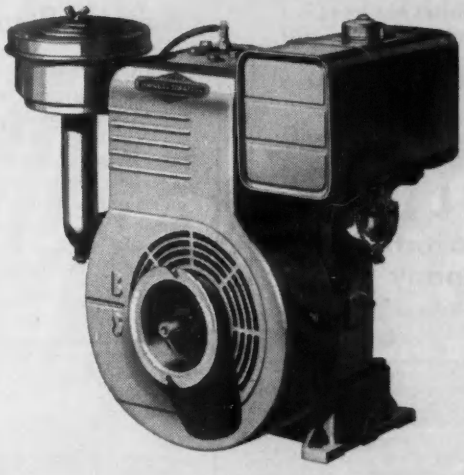
H. C. Price Somastic Division Is Awarded Major Coating Job

Fish Constructors, Inc., has let a contract to the Somastic division of H. C. Price Company, Bartlesville, Okla., for the coating of more than 40 miles of pipe to be used on the Transcontinental Gas Pipe Line Company's line from Texas to New York City. The contract, which will be performed at the division's Philadelphia plant, includes the coating of more than 100,000 feet of 30-inch pipe. Special equipment was prepared at Bartlesville and shipped to Philadelphia to facilitate handling the great amount of large diameter pipe.

Halliburton Assigns Hearn

Hosea P. Hearn, superintendent of Halliburton Oil Well Cementing Company, Denver, representing the Rocky Mountain area, has been assigned an additional division, which includes the Pacific Coast area. He will continue with his duties in the Rocky Mountain area and will maintain his residence in Denver.

Compact... and TOUGH



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New Drill Pipe For Sale

- 12,200 feet 3½" OD J & L internal 13.30# Range 2 Gr E
- 3½" Xtrahole unitized hardfaced tool joints attached to pipe 4¾" OD 2-7/16" ID
- 3½" pressed type thread protectors on tool joints

If interested in purchase, write, wire or call

BELL Transportation Company

P. O. Box 8598, Houston 9, Texas
1406 Hays Street Tel: CA-9678

■ FOR SALE: Approximately 25 miles 4" OD plain end pipe in line. Public Service Corp. of Texas, 902 Burk Burnett Bldg., Fort Worth, Texas.

■ WELL DRILLING EQUIPMENT. New and used rotaries, spudders, core drills, shot hole and standard outfits. Tools, cable, pipe. Everything for well drilling. Pressey & Son, Pueblo, Colo.

■ Up-to-date two color Oil and Gas Map of Texas on 38" wall mounting spring roller. Shows all oil and gas fields in orange color up to March 1, 1950. Geophysical prospects are also shown in black in a few important counties. Price $10.00. Ultra-Geophysical Service Co., P.O. Box 1231, Fort Worth, Texas.

■ FOR SALE (Subject to prior sale)—3 Bolted tanks, 2 in original crates and 1 assembled, (100 Bbl.). 69'-14" 57# Drive Pipe; 170'-10¾" 41# Drive Pipe; 407'-10¾" 32.75# Casing 8Rd. Thd. Smls.; 3045'-8" 24# Casing 8Rd. Thd. Smls.; 6286'-7" 23# Casing 8Rd. Thd. Smls.; 8101'-3" 9.20# Tubing Smls.; 1453'-2⅛" Tubing EUE Smls.; 14,226'-2" 6.40# Regular 10Rd. Thd.; 375'-¾" Pumping Rods; 9-5" Orbit Gate Valves; 9-" Orbit Gate Valves; 3-2" Orbit Gate Valves; 3-2⅞" x 6" Parmco Combination Packer; 1-2⅞" x 6" Larkin Screw Trip Packer; 1-3" x 6" Parmco Packer; 1-2⅞" x 6" Gas Anchor Packer. M. B. Belden Office at 425 2nd St., N. W., Canton 2, Ohio, Phone 4-6147.

WANTED TO BUY

Interested in small portable double-mast rig, capable of drilling to approximately 2000 feet, with or without drill pipe. Equipment must be in good condition and reasonably priced. Preferably located on Southwest Texas. Contact:

MAKIN DRILLING COMPANY
Box 131 Phone 131
Hobbs, New Mexico

LEASES, DRILLING, ACREAGE, ETC.

■ LEASING LAND, Curing Titles, General Land Surveying — Telephone or Write Guy A. Stonecipher, Rt. 5 Box 576, Beaumont, Texas.

HELP WANTED

■ Several openings are available for research in secondary recovery of petroleum. Some teaching may be required; salary commensurate with qualifications. Candidates will please send complete record of education and experience plus a small photo with their applications to Director, Mineral Industries Experiment Station, The Pennsylvania State College, State College, Pa.

Refinery Process Engineer

Experienced man, engineering degree, for mid-continent independent refinery having 20,000 bbl. daily thruput. Facilities include thermal and catalytic cracking, furfural-vacuum & M.E.K. dewaxing units. Responsible position, unusual opportunity. Please list full experience, background, age, & salary required. Replies will be held confidential. Box 79-W, World Oil, Houston, Texas.

Experienced Geologist

WANTED by well established, adequately financed independent oil company spending on development near two million dollars annually, for executive position experienced geologist familiar with North and West Texas. Must be man of broad experience in geological work. Applicant must be not more than 40 years of age. Satisfactory salary. If not employed now, do not apply. Correspondence strictly confidential. Write Box 77-W, World Oil, Houston, Texas.

NOTICES, SERVICES

Experienced Geologist seeks capital backing for application of a new and technically sound method of mineral prospecting. For details write Box 72-W, World Oil, Houston, Texas.

EQUIPMENT and SERVICE SUPPLIERS' NOTES

One Million Man Hours without a lost time accident was the record set by Oil Well Supply Company's Witte Engine Works division. Rahe Russell, left, of the Kansas City Safety Council, presented the National Safety Council's Award of Honor to D. M. Hochswender, right, works manager. O. V. Ellis, center, accepted the award from the works manager on behalf of the employees.

Link-Belt Elects Davidson Vice President for Sales

Link-Belt Company has elected D. E. Davidson vice president for sales, with headquarters at executive offices, 307

D. E. Davidson

E. P. Berg

North Michigan Avenue, Chicago. Davidson, a mechanical engineering graduate of Armour Institute of Technology, was formerly general manager of the Pershing Road plant, Chicago. He has been with the company since 1924.

Eugene P. Berg, formerly assistant general manager, has been named general manager of the Pershing Road plant. Berg is a mechanical engineering graduate of Purdue University.

Ragsdale to Guiberson

The Guiberson Corporation has appointed R. G. Ragsdale as a field sales and service representative at Houma, La. Ragsdale was formerly with Republic Supply Company in Louisiana and Wyoming.

SITUATIONS WANTED

■ GEOLOGIST—30 yrs. old—2 yrs. roughnecking, 7 yrs. surface and subsurface geological work with major company in Canada, U. S., and South America, desires association with aggressive independent operator, or drilling contractor who is active in wildcatting. Prefer Rocky Mtn. area, or Canada. Pertinent details and references given on request. Address Box 73-W, World Oil, Houston, Texas.

■ SUBSURFACE GEOLOGIST, successful foreign experience, seeks foreign or domestic post. Can also handle paleontology. Box 76-W, World Oil, Houston, Texas.

New Books, Maps and Movies

Sedimentation

The second edition of "Principles of Sedimentation," by W. H. Twenhofel, professor emeritus of geology, University of Wisconsin, retains the approach and organization of the 1939 edition, but has been revised for readability and brought up to date. The number of illustrations, both line drawings and photographs, has been almost doubled in the current 673-page volume.

A discussion of the origin of sediments in general, and the origins of different forms of sediments in particular, is included. The consideration of sediments begins with origins, and proceeds through transportation and deposition to the formation of sedimentary rocks.

McGraw-Hill Book Company, 330 West 42nd Street, New York 18, N. Y. $6.50.

Geological Bibliography

Seismograph Service Corporation has published a 139-page volume, "Bibliography of Organic Reefs, Bioherms and Biostromes," as a service to the oil industry. The comprehensive index, edited by W. E. Pugh, contains more than 1000 references in geological literature relating to reef structures. References are complete and are cross-indexed by author, geographic location, geologic age and subject. The new book is the fifth in a series of exploration aids published by SSC.

Free copies are available to all accredited geophysicists and geologists who apply by mail to Seismograph Service Corporation, Kennedy Building, Tulsa.

Industry Freedom

"Speak Up For Freedom," a new 20-minute sound-slide film prepared especially for petroleum industry management constitutes a report to executives on the Oil Industry Information Committee progress made in the past three years, and the tasks ahead, in informing the public of the progressive character and policies of the petroleum industry.

The black-and-white film underlines the basic theme that every oil company and every oil man must play an active part in the information program. It spells out the objective of demonstrating that an industry free from government control and operation without undue restraints of regulation serves the public interest best.

Prints may be obtained from district representatives of the OIIC in Boston, New York, Philadelphia, Atlanta, Cincinnati, Chicago, Kansas City, Minneapolis, Dallas, New Orleans, Tulsa and Denver.

Secondary Recovery in Kansas

A joint project between agencies of the state of Kansas and the IOCC, "Summary of Secondary Recovery Production Statistics and Estimated Water-Flood Reserves, Kansas, 1948" contains a history of production from eastern Kansas counties as well as statistics on production from all Kansas counties.

Information in the report was compiled by Albert E. Sweeney, Jr., director of the compact's Secondary Recovery division, and was reviewed and approved by the Secondary Recovery Advisory Committee.

Tables summarizing the secondary recovery data on various Kansas counties are included. Production histories are presented graphically and nine maps of the producing areas of Eastern Kansas are included.

Interstate Oil Compact Commission, P. O. Box 3127, State Capitol, Oklahoma City 5, Okla.

Technical Bibliography

Technical documents, most of them available to the American public for the first time, are listed in "Bibliography of Technical Reports." The documents, all accompanied by abstracts or subject catalog descriptions, are derived principally from federal or federally sponsored research, and cover a wide variety of subjects. The bibliography is issued as a monthly publication.

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When all factors are considered, Carlon Plastic Pipe will reduce transmission costs. The dense smooth internal surface of plastic pipe reduces friction between fluid and walls, and less fluid turbulence is created by internal surface irregularities.

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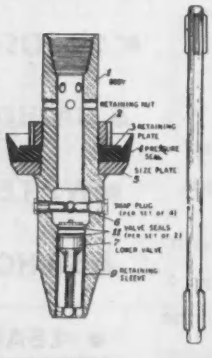

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SQUEAKS from the BULLWHEEL

Unaccountable

She was "Honey Chile" in New Orleans,
The hot spot of the bunch;
But on the old expense account
She was gas, cigars, and lunch.

Logical Development

An examining physician of a psychiatric hospital was testing the mental capacity of an incoming patient: "Now, my good man, what would happen to you if I cut off one of your ears?"

The patient replied sanely: "I couldn't hear so well."

Doctor: "And what if I cut off both your ears?"

Patient: "I couldn't see."

Doctor (indulgently): "And why would you not be able to see?"

Patient: "Well, Doc, if you cut off both my ears, my hat would fall down over my eyes."

Feminine Alchemy

Maybe you can't make a silk purse out of a sow's ear, but many a woman has gotten a mink coat out of an old goat.

Newsworthy

"Extra! Extra! Read about the two men swindled."

"Here, boy, I'll take one. Say, there isn't anything in here about two men being swindled."

"Extra! Extra! Three men swindled."

Paper Doll

Newspapers are like women. Why? Because they have forms, back numbers are not in demand, they always have the last word, they are worth looking over, they have a great deal of influence, you can't believe anything they say, there's little demand for the bold-faced type, they're much thinner than before, every man should have one and not borrow his neighbor's.

The Tide's In

Sailor's wife: "Remember when we first married—you used to say I had a shape like a beautiful ship?"

Sailor: "Yeah, but your cargo has shifted."

Rush Job

A Hollywood film star sent her visiting cards to her former husband's new bride.

"I'm sending them by air mail," she wired. "Trust they don't arrive too late to be of use to you."

Great Future

Boss: "Shame on you. Do you know what we do with office boys who tell lies?"

Boy: "Yes, sir. When they get old enough the firm sends them out as salesmen."

Prospects

Three small boys were sitting on the curb. One was playing with an airplane, one was playing with a fire engine, and one was reading *Esquire*.

A kindly old gentleman approached and asked them what they wanted to be when they grew up.

The first replied that he wanted to pilot a jet plane.

The second wanted to be a fireman.

The third, looking up from his magazine, replied, "Aw, it isn't important, I just want to grow up."

"Yes, Phillips, that was a little too much dynamite."

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1 ELECTRIC WIRE LINE SERVICES

1. PERFORATING—Deepest penetrating burrless bullet and jet.
2. BRIDGING PLUGS—Drillable, expandable. McCullough and Baker.
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4. JET CASING CUTTERS*—World's fastest casing, tubing, drill pipe cutter!
5. JET BACK-OFF TOOL* and STRING SHOT—World's fastest way to recover stuck pipe!
6. JET BOTTOM HOLE CUTTERS*—Fragmentizes lost or stuck fish!
7. ELECTRONIC WEIGHT INDICATOR*—Supersensitive, small, light!
8. SONIC DEVICE*—Locates collars, liner tops, well bottom, etc.

2 ROTARY SERVICES

1. DOUBLE ACTING ROTARY JARS* and BUMPER SUBS—Reduces number of fishing jobs!
2. SAFETY JOINTS—Releases quickly in emergencies!
3. EXTERNAL DRILL PIPE CUTTERS—For all outside pipe cutting.
4. MECHANICAL LONG KNIFE INTERNAL CASING CUTTERS—All sizes pipe, tubing.
5. THIN WALL EXTERNAL CASING CUTTERS*—For outside cutting in small clearances!
6. ROTARY RELEASING OVERSHOTS—Completely encircles fish.
7. ROTARY RELEASING SPEARS—Engages or disengages at will.
8. GUN TESTER—Water shut-off, perforating, testing in one run.

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Proved in the toughest wells in major oil fields where other methods had failed. *New* production, *increased* production, *maximum* production in every case! A deeper, straighter hole. No carrot, slug or debris!

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Flashes from the BEACON

WE HAVE A NICE, fat file labeled "BEACON RESULTS." It's a catch-all for things that happen because of the BEACON.

* * *

WE HOLD THIS "BEACON RESULTS" file in much the same tender regard as a coed does her string of dance programs or an early Apache held his string of scalps. It's as rewarding as keeping a diary and not nearly so incriminating.

* * *

AMONG OUR wackier results is the recent bringing together of two first cousins who hadn't seen or heard from each other for 18 years. One is a BS&B employee (in extremely good standing)—Al Geiger, sales engineer in our Tulsa office. Al's name and picture

"I can't even remember tying the string on my finger!" . . . a BEACON *Original* by Dave Hunt.

have appeared in the BEACON a couple of times recently and one news story mentioned the Geiger twins, born last September. All this intelligence came as something of a shock to one reader in Cleveland, Ohio,—a foundry foreman with a chemical company—who recognized Al as his literally "long-lost" first cousin. He writes that he last saw Al in 1932 when the Cleveland cousin was working on Al's dad's farm at Haskell, Oklahoma.

* * *

HAVING reunited the happy cousins, the BEACON is looking for other sweetness and light to spread . . . Even if you know where every last cousin is, the BEACON just might have a "message" for you. Anybody can take a chance with us, for free. Just get out your company letterhead and write to:

BLACK, SIVALLS & BRYSON, INC.
Industrial and Public Relation Division
720 Delaware
Kansas City, Missouri

SQUEAKS FROM THE BULLWHEEL

Where It Goes

Teacher: "Where is the capital of the United States?"

Johnny: "In loans all over the world."

The Convex View

Dieting is the triumph of mind over platter. Early rising is the triumph of mind over mattress.

The exclamation mark is being discarded because people aren't surprised at anything these days.

Some people have no respect for age—unless it's bottled.

The only place in America where you can't have free speech is in a telephone booth.

If a girl expects to win a husband, she ought to exhibit a generous nature, or else how generous nature has been to her.

The fellow who says, "It goes without saying," goes right ahead and says it anyway.

Quiet Type

"Who gave the bride away?"

"Well, I could have, but I kept my mouth shut."

Precaution

"On her 18th birthday I gave my daughter her first front door key."

"That was the proper modern spirit, old man."

"Not necessarily. I just got tired of having her knock off the milk bottles crawling through the pantry window."

"Simpson, must you always bring your troubles to me?"

Random Harvest

Mother: "After all, he's only a boy, and boys will sow their wild oats."

Father: "Yes, that's true. But I wish he wouldn't mix so much rye with it."

Earthbound

A New England epitaph reads: "Here lies an athiest, all dressed up and no place to go."

Wasteful

A man went into a bar, ordered a martini, drank it, nibbled the rim of the glass and threw the stem over his shoulder. He continued this for about six martinis and noticed that the bartender was staring at him.

"I guess you think I'm crazy, don't you?" he asked.

"I sure do," replied the bartender. "The stems are the best part."

Steel Problems?

Call Jorgensen First

Why take chances on being jolted around in today's rock 'em and sock 'em competitive market by using the wrong steel for the job? Certain steels are designed to *resist* shock, and others to *absorb* it, so it's important to fit the steel to the job. You can obtain the *right* steel for your job from Jorgensen, because Jorgensen maintains complete warehouse stocks of carbon, alloy, tool, stainless and specialty steels. And if you need help in selecting steel for a particular application, Jorgensen can supply *that* too! For *complete* steel service, for *fast* action, ***CALL JORGENSEN FIRST!***

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STEEL

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CHarter 1761	HIgate 4-2030	Enterprise 10942	LUcas 0281

"Hoot mon! They must have been reading our blue prints when they designed this thing for speed."

TYPE CP

TRAVELING BLOCKS

- **SHORT, uses minimum headroom.**
- **THIN, provides more derrick room for pipe racking, etc.**
- **ADAPTABLE, connects directly to standard hooks.**
- **BALANCED, for a straight true fall.**
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Write for further information on this and other McKissick products

McKISSICK

McKISSICK PRODUCTS CORPORATION

SQUEAKS FROM THE BULLWHEEL

Tomato Surprise

A young bride was annoyed by her husband's presence in the kitchen while she was preparing dinner. And when he accidentally knocked her cookbook to the floor, she flared up.

"Now look what you've done. You've lost the place, and I haven't the faintest idea what I was cooking."

Ownership

A university professor, who had just checked out of a large hotel, suddenly remembered that he'd left his umbrella in the room. He scurried back and went to the room he'd just vacated. When he got outside the door, he heard voices. The room had already been rented—apparently to newlyweds, for this is what he heard: "Whose iddle pink mouth is that?" "Yours," came the sweet reply. "Whose iddle turned-up nose is that?" "Yours." "Whose iddle handsikins are those?" Same answer. The professor didn't wait to hear more. He rapped smartly on the door and shouted: "See here, my lad, when you come to an umbrella, that's mine!"

At Home

Said Satan to his new arrival, "You act as if you owned this place."

"I do," was the reply, "my wife just gave it to me before I came here."

Pullman Service

His hotel was near a railroad yard, and all night long the engines shunted cars around—crashing and banging. Whistles and bells sounded continually.

He fought the noise until daybreak, then telephoned the desk and inquired wearily. "Tell me, what time does this hotel get to Chicago?"

Heavyweight Champion

A man who discovered the joys of fishing rather late in life became even more insistent than ordinary anglers upon recounting his triumphs to skeptical acquaintances. Enraged by their thinly-veiled hints that he was a liar, he bought a pair of scales, installed them in his library, and made his friends watch while he actually weighed the fish he had caught.

One evening a neighbor burst in excitedly and sought permission to borrow the scales. He was back in ten minutes, his face flushed with delight. "Congratulate me," he cried, "I am the father of a 24-pound baby boy!"

"Yeah, we laughed—but the first well made 20 barrels a day and he's moved to his second location."

The Test

Two little boys were idly fishing from the banks of a stream, when one turned to the other and asked:

"How old are you?"

"I'm five," was the reply. "How old are you?"

"I don't know," said the first boy.

"You don't know how old you are?"

"Nope."

"Do women bother you?"

"Nope."

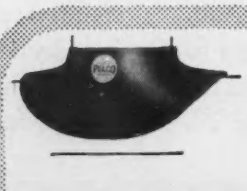
"You're four."

Bonus

A lawyer was always lecturing his office boy, whether he needed it or not. One day he heard this conversation between the boy and one employed next door:

"How much does he pay you?" asked the latter.

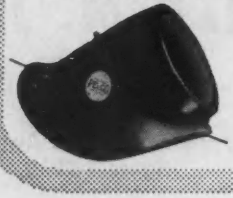
"I get $5000 a year," replied the lawyer's boy. "Ten dollars a week in cash and the rest in legal advice."



Specify **PELCO**

Welding Saddles

PELICAN WELL TOOL & SUPPLY CO.



P. O. Drawer 1108
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SEE YOUR NEAREST SUPPLY HOUSE

The OIL WEEKLY

Gulf Coast Issue

WORLD OIL

JUN 16 1950
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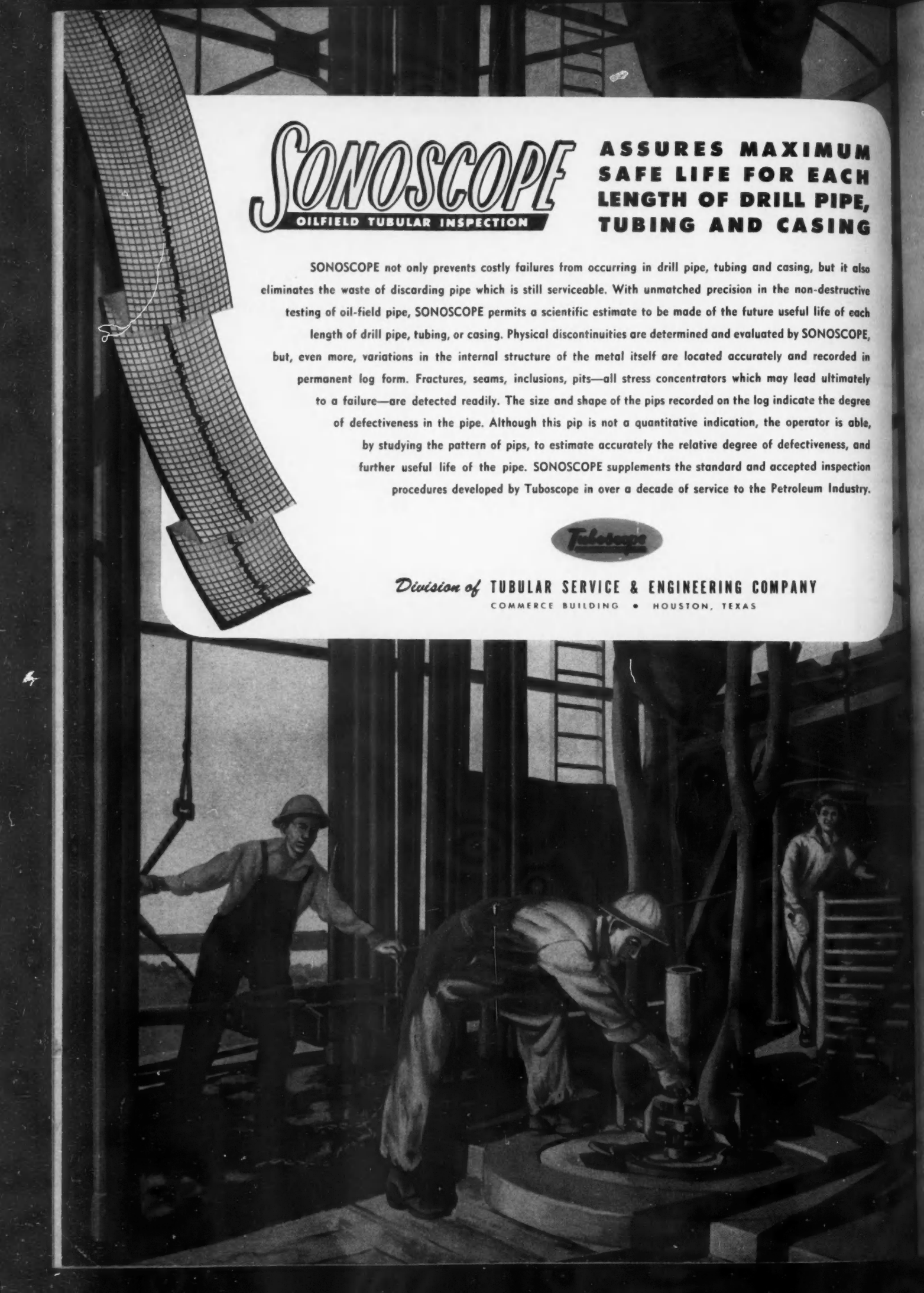
Million-dollar rock pile to make more hole faster

The honeycombed rock pile at Hughes laboratory represents research costing more than a million dollars.

This unique laboratory furthers our field knowledge as to which bit designs work best in granite, chert, dolomite, limestone, sandstone and other formations found all over the world. By drilling into these test blocks, under rigidly controlled operating conditions, the action of different cones can be studied and the best type of bit for every drilling problem definitely established.

This is just one illustration of the intensive research program—started in 1911—which Hughes Tool Company conducts in a never-ending effort to build better rock bits. Rock bits that will enable the petroleum industry to "to make more hole faster." This combined experience gained in laboratory *and* field over the years has given Hughes the greatest backlog of know-how in the business!

HUGHES
TOOL COMPANY
HOUSTON, TEXAS
World Standard of the Industry



SONOSCOPE

OILFIELD TUBULAR INSPECTION

ASSURES MAXIMUM SAFE LIFE FOR EACH LENGTH OF DRILL PIPE, TUBING AND CASING

SONOSCOPE not only prevents costly failures from occurring in drill pipe, tubing and casing, but it also eliminates the waste of discarding pipe which is still serviceable. With unmatched precision in the non-destructive testing of oil-field pipe, SONOSCOPE permits a scientific estimate to be made of the future useful life of each length of drill pipe, tubing, or casing. Physical discontinuities are determined and evaluated by SONOSCOPE, but, even more, variations in the internal structure of the metal itself are located accurately and recorded in permanent log form. Fractures, seams, inclusions, pits—all stress concentrators which may lead ultimately to a failure—are detected readily. The size and shape of the pips recorded on the log indicate the degree of defectiveness in the pipe. Although this pip is not a quantitative indication, the operator is able, by studying the pattern of pips, to estimate accurately the relative degree of defectiveness, and further useful life of the pipe. SONOSCOPE supplements the standard and accepted inspection procedures developed by Tuboscope in over a decade of service to the Petroleum Industry.

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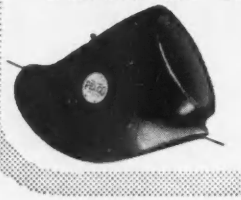

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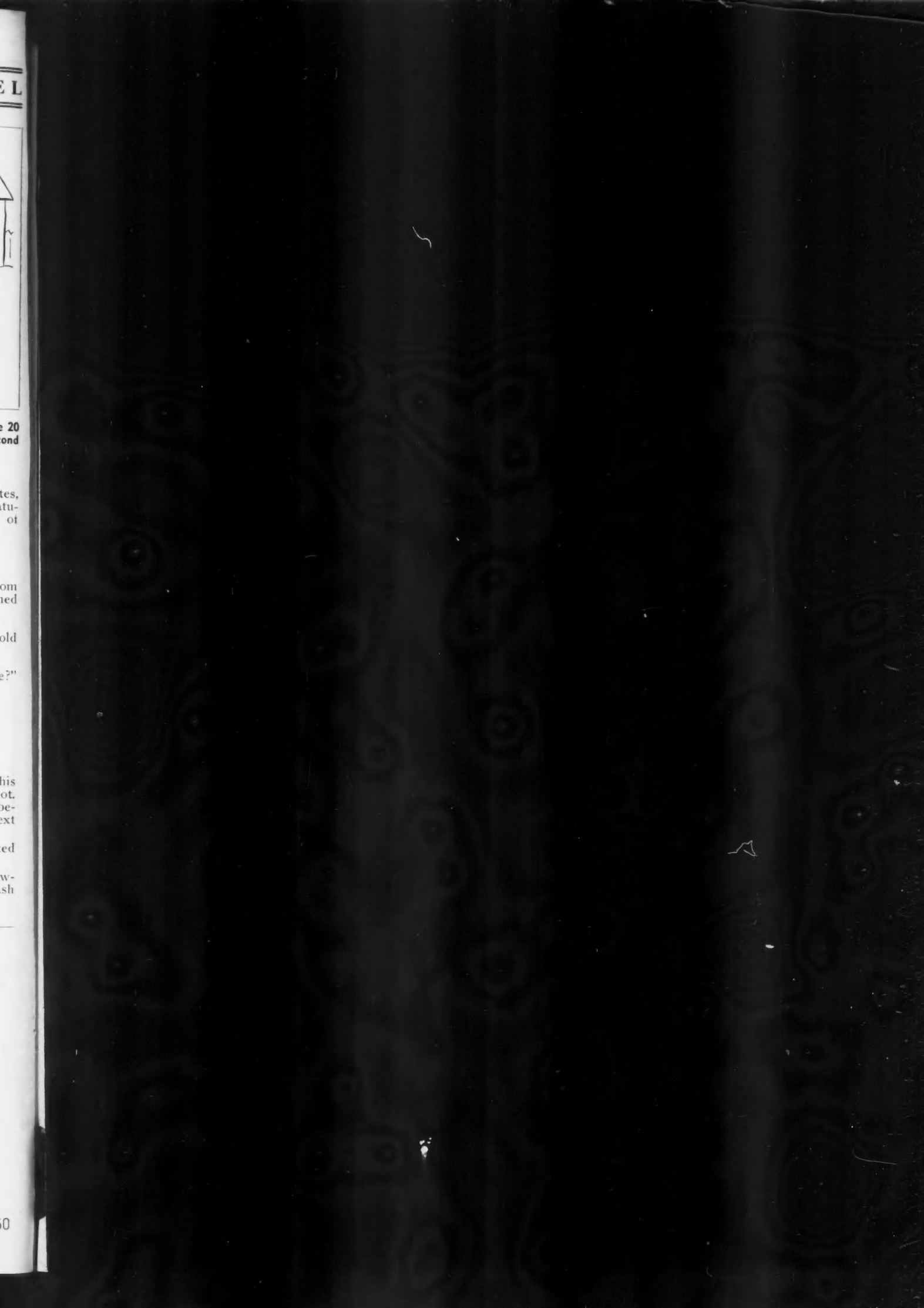

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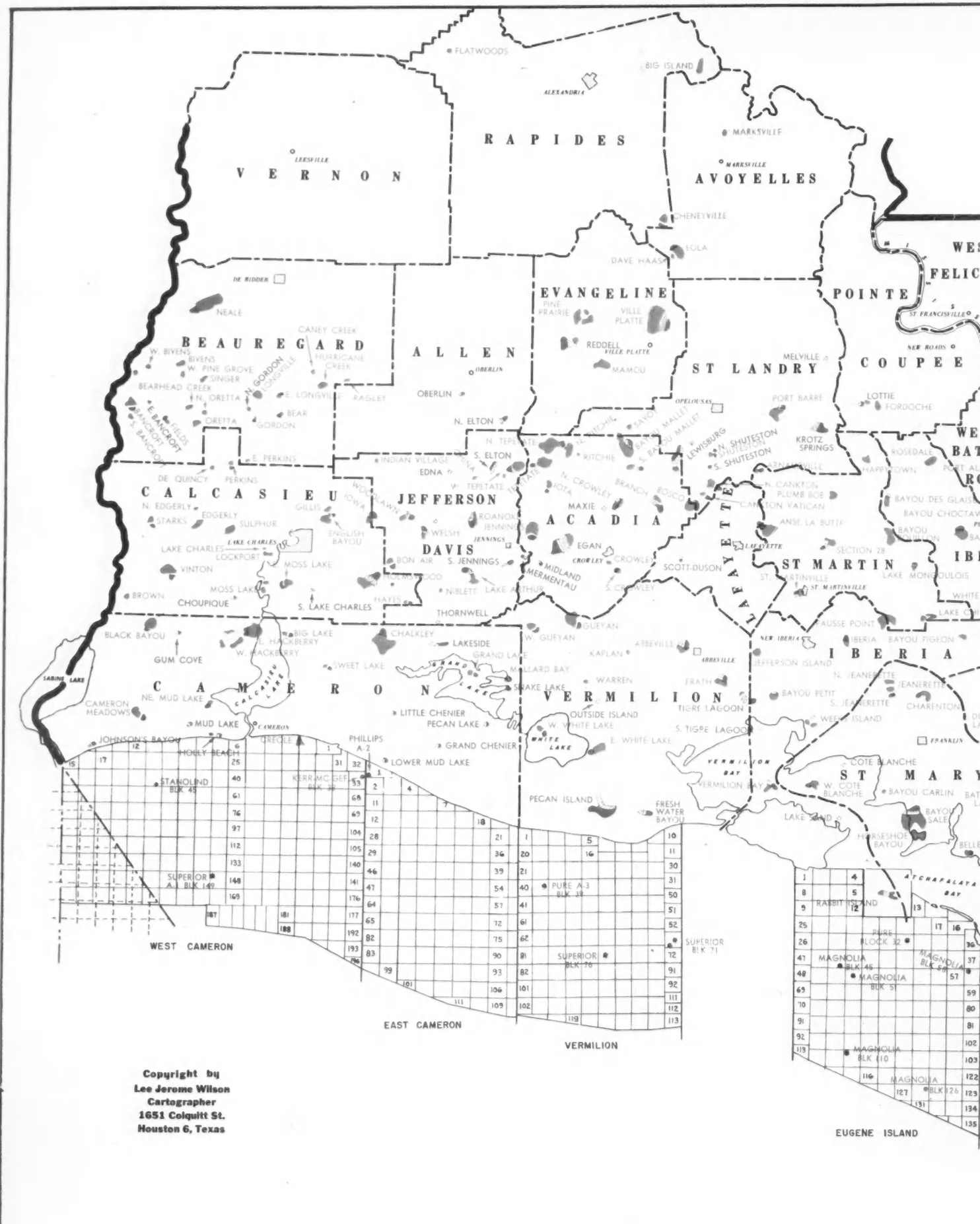

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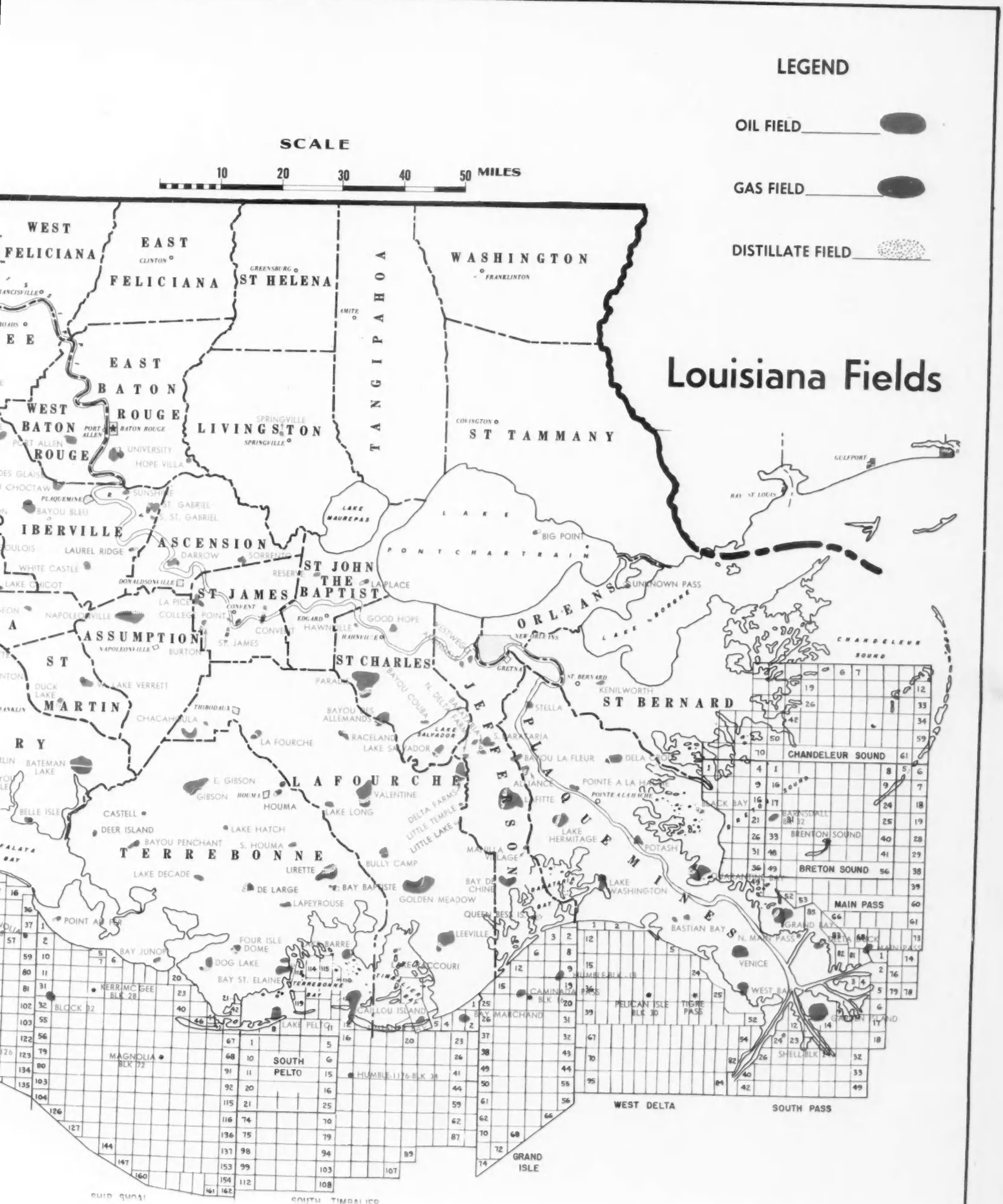

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SECTIONS FOR EXPLORATION, DRILLING, PRODUCING, LINE OPERATIONS AND MANAGEMENT

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